Identification of the Halloween Effect in Swedish Sectors

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SUMMARY

Our thesis researches the Halloween effects in the Swedish stock market from a sector perspective. The notion Halloween effect refers to higher returns during the period November until April than the period May until October. The anomaly has been confirmed by previous researchers in Sweden among other countries. There has not been any definite explanation for this anomaly. The majority of explanations base on the assumption that the anomaly is a market wide and induced by changes in investment behavior. However, previous research has shown that the Halloween effect could be limited to certain sectors which experience significantly higher returns during winter months than the summer months. The sectors that exhibited the high Halloween effect tend to be heavy industry sectors while consumer oriented sectors tend to outperform during summer periods. Previous research on the Halloween effect from a sector perspective has been done on the U.S market. In our study we research the Swedish sectors to test whether the findings of previous researches are true for other market as well. To our understanding there have not been published any research on the Halloween effect in Swedish sectors. In our research we will test the significance of the Halloween effect in our different sectors through linear regression models with dummy variables. Our research has led to a number of findings that provide further understanding to the Halloween effect in sectors. Our result indicates that the Halloween effect is present in a few sectors and not market wide. The findings thus support previous research that the Halloween effect is sector specific. The sectors that exhibited the highest Halloween effect were sectors in heavy industry, our findings thus support the ones of previous researchers. However, our findings did not sufficiently support the connection that consumer sectors tend to outperform during summer periods. Despite that our findings are not matching the ones of the previous research in some regards. We believe that our findings indicate that previous researchers are on the right track on finding underlying factors for the Halloween effect. Additionally, we hope that our results increase investors' market timing ability by presetting which periods certain sectors outperform

Keywords: *Halloween effect, Sell in May effect, Sell in May and Go Away*

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1. INTRODUCTION

Our introduction chapter starts by introducing the reader to the background of our research topic and how our research is connected to previous research. The next sections are the problem statement and the research question. This is followed by the purpose and contribution of the study as well delimitations that have been done. Lastly, we present the disposition of our study and a list of definitions that used in our thesis.

1.1 Problem background

There has long been the idea that the months during the winter have performed better than the months during the summer in terms of returns from the stock market. There is one old saying that illustrates this common wisdom: "*Sell in May and go away but come back at St. Legers day*". May is the start of a period that is thought to give lower returns. The period continues until St. Legers day, which is a classic horserace in England that takes place during September month (Bouman & Jacobsen, 2002, p. 1618). This simple idea is the background to the Halloween effect, which divide the year in two periods; winter and summer period. Bouman and Jacobsen (2002) proved that the period November to April give consistent higher returns than the period May until October. In their research they could confirm the effect in 36 out of the 37 countries they researched, including Sweden (Bouman and Jacobsen, 2002, p. 1618). Several other researchers have since then confirmed the Halloween effect for different markets; Lucy & Zhao (2008), Jacobsen & Visaltanachoti (2009), Haggard & Witte (2009) etc. The Halloween effect is a seasonal anomaly; there is no economic rationale for the average return to be higher during winter than summer month (Bouman & Jacobsen, 2002, p. 1620).

The existence of an anomaly such as the Halloween effect leads naturally to question the whether there existed profit opportunities in the past (Schwert, 2003, p. 939). Other calendar anomalies such as January effect, Monday effect and Friday effect are in most cases not worth exploiting due to transaction costs (Bouman & Jacobsen, 2002, p. 1619). Halloween effect can be easy utilized to earn higher returns than a buy and hold portfolio. Investing in strategies based upon Halloween effect will not cause high transactions cost due to low frequency of changes in positions. Bouman and Jacobsen (2002) found that the Halloween effect is statistically significant despite the transaction cost. The Halloween effect is puzzling and it contradict in many ways the accepted financial theory. Efficient market hypothesis assert that it is not possible to make abnormal profits with ex-ante information. The weak form of the efficient market hypothesis states that the prices of certain assets should reflect all possible information available, hence are prediction on ex-ante information done in vain (Bodie et al., 2011, p. 375). This is contradicted by investment strategies based upon the Halloween effect that utilizes the higher returns in winter months to reap higher rewards. Another puzzling characteristic of the Halloween effect anomaly is that it has not weakened since the discovery more than a decade ago (Jacobsen & Visaltanachoti, 2009, p. 443). Schwert (2003) pointed out that anomalies tend to vanish as soon as they have been documented in financial literature (Schwert, 2003, p. 940).

So far there have not been any definite explanation for the Halloween effect; however several theories have been put forward as suggested causes of the Halloween effect. One suggestion is that the Halloween effect is merely spill over from the well-known January effect. The

Halloween effect has however proved to be independent from all other seasonal anomalies such as the January effect (Jacobsen & Visaltanachoti, 2009, p. 442). Another suggestion that have been put forward is that the higher returns are simply compensations for higher risk taken during winter months; Bouman and Jacobsen (2002) did not find any support for this, as they found that the risk measured in standard deviation is consistent through the whole year (Bouman & Jacobsen, 2002, p. 1626). Most explanations build upon the assumption that the Halloween effect is market wide anomaly where the research mainly tries to explain the anomaly with changes in investment behavior (Jacobsen et al., 2005, p. 4). Bouman and Jacobsen (2002) regarded it important to investigate whether it is a sector specific anomaly or whether market wide. If the Halloween effect is a market-wide anomaly then macroeconomic factors should be looked over in order to find the explanation (Bouman & Jacobsen, 2002, p. 1628).

We aim to further analyze the question that Bouman and Jacobsen presented; whether the anomaly is market wide or whether it's sector specific. Jacobsen and Visaltanachoti (2009) regarded that there is too little known about the Halloween effect to rule out other explanations that does not base on the assumption of a market wide anomaly (Jacobsen and Visaltanachoti, 2009, p. 438). Many factors that could possibly explain this anomaly have been researched; Jacobsen, Mamun and Visaltanachoti (2005) found no evidence that other factors commonly associated with anomalies; *book to market, size, earnings to price and cash flow to price* could not sufficiently explain the Halloween Effect. The only factor they found some connection to was that Halloween effect seemed to be more common in low dividend yield portfolios (Jacobsen et al., 2005, p. 15). Currently the most research bases on the condition that the Halloween effect is a market wide anomaly and thus could be explained by changes in investment behavior. However, Jacobsen & Visaltanachoti (2009) found that the Halloween effect was related to different sector in the US market. The findings of differences in U.S sectors in terms of Halloween effect by Jacobsen & Visaltanachoti (2009) indicate that there could be more to it than the assumption of a market wide anomaly. Jacobsen and Visaltanachoti (2009) found there to be large differences between sectors in terms of experienced Halloween effect (Jacobsen & Visaltanachoti, 2009, p. 438). The differences were mainly between consumer and production sectors. Consumer sectors showed to perform better during summer whereas production sector yielded higher returns than the market during winter months.

1.2 Problem statement

Previous research have been successful in proving that the Halloween effect exists in different markets but the Halloween effect from a sector perspective have not been sufficiently explored. By further analyzing the Halloween effect from a sector perspective we hope to bring further light to the question posed by Jacobsen & Visaltanachoti (2009) whether the Halloween effect is isolated to a few sectors or market wide. Their research proved that there are significant differences between sectors in terms exhibited Halloween effect, i.e. differences between returns of winter and summer periods. Their research however covered only U.S market, hence we find it important to further test whether the results by Jacobsen & Visaltanachoti (2009) are the same for other markets. We will research the Swedish sectors as to our understanding there have not been any research done on the Swedish industrial sectors in terms of Halloween effect. Our research will analyze a set of industrial sectors in order to test whether the different sectors have significant a significant Halloween effect. The test will provide further insight which sectors tend to have higher degree of Halloween effect. As previously mentioned, Jacobsen & Visaltanachoti (2009) found there to be significant differences between production and consumer sectors. We will further analyze our set of industrial sector from to see if there is any support to the results of Jacobsen & Visaltanachoti (2009) in the Swedish industrial sectors.

1.3 Research question

Table 1: Research question
Is the Halloween effect isolated to specific sectors or present market wide?

Table 1: Our chosen research question, we will revisit this question in our empirical chapter where we attach hypotheses in order to test and answer it.

Bouman and Jacobsen (2002) found in their research support for the Halloween effect in Sweden among other countries. Their research covered the period 1970-1998. To ensure that the Halloween still exists in the Swedish market as whole, we will test whether the Halloween effect is statistically significant for the period 1998-2012 and the period 1969-2012. After testing for the general market we will analyze the Halloween effect in terms of sectors whether the effect is a market wide anomaly or sectors specific. Our data sample covers 9 different sector indices in the Swedish market for the period 1994-2013. We will use linear regression to test whether the returns for the winter periods are significantly different from returns of the summer periods. Furthermore we will analyze the sectors in terms of risk to see whether the risk measured in standard deviation changes during the year. As mentioned earlier the most explanations assume a market wide anomaly induced by changes in investment behavior, hence by this logic there should be changes to the risk if there are changes in investment behavior for the different periods.

Jacobsen and Visaltanachoti (2009) results showed that there are substantial differences in terms of Halloween effect between production and consumer oriented sectors in U.S sectors. We will further research this connection to see whether the same is true for the Swedish sectors. In order to provide some practical relevance to our findings we will in similarity to Bouman & Jacobsen (2002) and Jacobsen & Visaltanachoti (2009) present a strategy that could capitalize on possible profit opportunities that arises along the Halloween effect and measure their performance against a normal buy and hold portfolio to evaluate the strategies.

1.4 Purpose

Our thesis attempt to provide more answers to question whether the Halloween effect are isolated to a few specific sectors or whether it’s present market wide. We will also further examine whether we can identify common characteristics of the sectors that exhibit the Halloween effect. Our results will be compared to previous research to see whether the inference made by Jacobsen and Visaltanachoti (2009) on differences between consumer and production oriented sectors is valid for Swedish market as well. We hope to provide practical relevance to investors by including a strategy that takes advantage of the Halloween effect. We hope that our results could benefit other researcher and spur more research within the field to further pinpoint the underlying causes to the Halloween effect anomaly.

1.5 Contribution

We regard that our research contribute to research on the Halloween effect mainly in two ways. Firstly, the research on Halloween effect from a sector perspective is limited, to our understanding there have not been any article published on the Halloween effect in Swedish sectors. We will provide empirical results which sectors in the Swedish market exhibit significant Halloween effect. This should be of interest for other researcher trying to pinpoint the underlying causes of the Halloween effect. We hope also that investor could benefit from knowing which periods certain sectors outperform to increase their market timing ability.

Secondly, our research tests the findings of Jacobsen and Visalatanachoti (2009) in a different market. Jacobsen and Visaltanachoti (2009) found there to be significant differences between consumer oriented sectors and production sectors where production exhibit large Halloween effects while consumer oriented sectors outperform during summer periods. Our empirical results show support to this idea in regard to significant Halloween effect being isolated to production sectors, however we don't find significant support for the consumer sector outperforming during summer periods. We hope that our results could further improve the idea presented by Jacobsen and Visaltanachoti (2009) by testing this connection in other markets than U.S.

1.6 Delimitation

Our study is thus limited to the Swedish market and will focus more upon the Halloween effect in the Swedish sectors as the Halloween effects have been confirmed for the general Swedish market by Bouman and Jacobsen in 1998. We will not test specific explanations to the Halloween effect rather attempt to further analyze the broad question of a market or sector specific Halloween effect. The data sample is limited to specific set of industrial sectors are thus not covering all available sectors in the Swedish market due to limitations in available data. The time period in our research is also limited according to the available data and thus will focus on presenting results on the Halloween effect in Swedish sectors during the period 1994-2013, our results will thus reflect the current Halloween effect in Swedish sectors.

1.7 Disposition

Our introduction chapter has been focused on presenting the background of the research topic as well as clarifying what we will cover and attempt to answer in our research. We have structured the thesis in the following way.

Chapter 2: Theoretical methodology We have divided our methodological chapter into two different parts, in our theoretical methodological chapter we will discuss the research design and methodological assumption made.

Chapter 3: Theoretical frame of reference In this chapter we will start by providing the previous research on the Halloween effect then continue to present key concepts that is relevant to our research.

Chapter 4: Practical Methodology The theoretical methodological chapter presented our research process in broad strokes, in this chapter however we specify the practical steps taken in our research that have led to our results in the upcoming chapter. We will also present information on our chosen sectors as well as other variables used in our equations. The last part in this chapter is criticism against our chosen methodology; here we present issues with our chosen sample that we regard that the reader should be aware of while reading the upcoming chapters.

Chapter 5: Empirical results Our empirical results are divided into three parts first we will test the Halloween effect for the general market then we continue to the essential part of our research the empirical testing of Halloween effect in the Swedish sectors. Lastly we present short results and discussion possible strategies that could capitalize on the Halloween effect.

Chapter 6: Analysis Our analysis chapter will follow the same structure as the previous chapter by first start with briefly discussing and the general market then continue into the analyzing the sectors. We will discuss the results of our hypotheses testing and make connection to the finding of previous research. We will present the answer to our research question and discuss the characteristics of the sectors that exhibit significant Halloween effect.

Chapter 7: Conclusion and further research In our last chapter will present the most important findings of our research. We will end our thesis with presenting issues that we could not include in our thesis but that we regard should be further researched

1.8 Term definitions

To avoid confusion for the reader we have computed a list of explanations and definitions of terms that are frequently used in our thesis.

Sell in May effect – Is another notion for the Halloween effect. The Sell in May effect derive from the Saying "Sell in May and Go Away" which is more common in Europe while Halloween effect is more commonly used in United states (Jacobsen & Visaltanachoti, p. 440).

Buy-and-hold portfolio – The notion refer to a portfolio that utilizes a passive investment strategy, the assets are bought and hold for a longer period of time.

Anomalies and market inefficiencies – An anomaly exist when the empirical results are inconsistent with the results predicted by the accepted financial theories covering asset and pricing behavior. This could be a market inefficiency which indicates that there is an opportunity or making profits due to the market not being efficient; prices are not reflecting the full information. The other explanation for the anomaly is that shortcoming of the asset and pricing model used for prediction (Schwert, 2003, p. 939).

Data mining – Also called 'data snooping' The term data mining could be explained as a process of going through large amounts of data to uncover systematic patterns and statistical aberrations which most properly happens due to chance (Brealey et al, 2011, p. G-4)

2. THEORETICAL METHODOLOGY

Our theoretical methodology chapter will start by presenting why we decided to research the Halloween effect and our pre-understanding on the topic. This is followed by our methodological assumptions and research design. Lastly we present criticism against our chosen sources.

2.1 Choice of topic

From early on we agreed to study market anomalies, as we both found it a fascinating area with many unsolved question. In the beginning of our research we thought of studying “the other January effect” in Swedish sectors but due to difficulties with finding suitable data to perform our research we decided to look for other topics which led us to the “Halloween effect”. The Halloween anomaly it’s a relatively newly discovered anomaly, first confirmed 1998 by Bouman and Jacobsen (2002). There are still many aspects of the Halloween anomaly that need to be further researched and thus there are large possibilities for contributing to the ongoing research. The possibilities for contribution and the puzzling characteristics of the Halloween effect appealed to us and ultimately lead us to researching it.

When looking over previous research on the Halloween effect in Swedish market we could not find any research done solely on the Swedish market. The research that covered the Halloween effect in the Swedish market was large studies on many different markets. We thought that a study on the Halloween effect in Swedish sectors could contribute to the research in the field. Providing explanations on why these anomalies exist and which factors induce them, provides more understanding to workings of the markets.

2.2 Pre-understanding

Our pre-understanding is developed from mainly theoretical knowledge and some practical experiences gained from personal interests in investing in stocks and funds. We are both students at Umeå School Of Business studying Business Administration with specialization towards Finance and accounting. We have studied the different subjects covered in our thesis e.g. Efficient Market Theory and CAPM in different courses given at Umeå School Of Business, mainly through the financial management courses. Apart from that, the knowledge we have gained from different statistics courses such as Analysis of financial data have been of great benefit during our research. We hope to stay objective by being aware of possible preconceptions induced by our previous experience and beliefs (Bryman & Bell 2007, p. 30).

2.3 Methodological assumptions

Ontology

Ontology refers to perceived reality; in other words it regards how we are interpreting the reality (Saunders et al, 2012, p. 130). Research in finance are usually trying to explain the market forces without involving investor psychology which allows the research to be narrowed down to manageable bits (Ryan et al, 2002, p. 52). In our research we are not going to indentify investor behaviors that induce the Halloween effect rather empirically test which sectors that show high degree of Halloween effect. This leads us to an objectivistic position which asserts that reality exists externally from our perceptions of it and that it is independent from influence of social actors (Saunders et al, 2012, p.131). If we would have a position of subjectivism then we would regard that the reality would be constantly influenced by social actors. This would be more suitable if we would focus on identifying behavioral patterns of different investors. Another position is constructivism regard that the reality is a constructed from the perceptions of social actors (Saunders et al, 2012, p.132). Furthermore, objectivistic position fits well with quantitative research which is suitable to our study as our research follow a quantitative nature (Bryman & Bell, 2011, p. 27).

Epistemology

The choice of epistemological position regards what we deem to be knowledge and how shall acquire it (Ryan et al, 2002, p. 11). In our research we have a positivistic position that regard that knowledge should be verified through observation and not by reasoning alone. We will thus use empirical testing to answer our research question about the Halloween effects presence in the Swedish market rather than make inferences through logic alone. Additionally our positivistic position leads us to use existing theories as foundation which our hypotheses could be generated from and tested upon. In positivism it is important that the data collected is unbiased and that the data remain free from subjective influences throughout the research (Saunders et al., 2012, p. 134). The data used in our research are the indices prices which are unbiased. We follow the positivistic position strictly by keeping an objective to view to knowledge through our testing procedure and making sure to not alter the substance of our data in anyway.

Another position that could be adopted is interpretivism which regard that the world is too complex to be examined through a positivistic viewpoint. In other words the position regards that social actors and their interactions can’t be examined in similar way as tangible objects. The position therefore holds that researcher needs to adopt an empathic view to understand the social actors view point (Saunders et al., 2012, p.137). This position is more related to qualitative research and thus suited to e.g. researching invest psychology to find with investment behavior influence the Halloween effect. Our thesis will not cover investment psychology rather use quantitative testing to answer our purpose of this study thus is a positivistic position more suitable.

2.4 Research approach

The reasoning a researcher adopts in order to make inferences between theory and empirical results is an important part of any research design. In our research we have adapted a hypothetical deductive process which differs from a deductive approach in the way that the approach starts; with formation of a hypothesis rather than starting with a presumption. The hypothesis is then scrutinized through empirical testing. We deem that the hypothetical deductive process is the best fit for our type of research. The hypothetical deductive process gives more freedom to the test process through the hypothesis rather than logical reasoning.

A hypothetical deductive process can be described as below (Teorell & Svensson, 2007, p. 50);

1. Present a hypothesis
2. Derive the consequences if the hypothesis is correct.
3. Empirical testing of the hypothesis.
4. Conclusions whether the hypothesis are supported in step 3 or not.

This is the blueprint for our research process in broad terms. We have derived several hypotheses that will test which sectors experience significant Halloween Effect. We have set up rejection regions for the different hypothesis according to previous research on the subject that will allow us to reject or accept our hypotheses. The results from the tests will allow us to make inferences how the Halloween effect manifest itself. The opposite way to make inferences between theory and empirical is the inductive approach which is not well suited for our type of research as we are not aiming to uses series of observations to form new theories rather work from well established theories and then put them through empirical testing. The deductive approach is positivistic and more commonly used in natural science whereas inductive approach is more interpretative and qualitative (Robson, 1993, p. 18).

2.5 Research strategy and design

We will research the Halloween effects existence in Swedish sectors to do this we will have to analyze past indices prices to test whether there a Halloween effect exist in the different sectors. This type of research requires a quantitative research strategy which mainly deals with the collection, processing and analyzing of data (Bryman & Bell, 2011, p. 26-27). Another research strategy is qualitative research, which is a more interpretative research. Qualitative research seeks the deeper meaning through reasoning often preformed through interviews (Saunders et al, 2012, p. 163). Additionally our chosen epistemological and ontological positions are suitable to quantitative research then in qualitative research. The deductive approach is also best used together with quantitative research as it focuses on hypothesis testing (Bryman & Bell, 2011, p. 27).

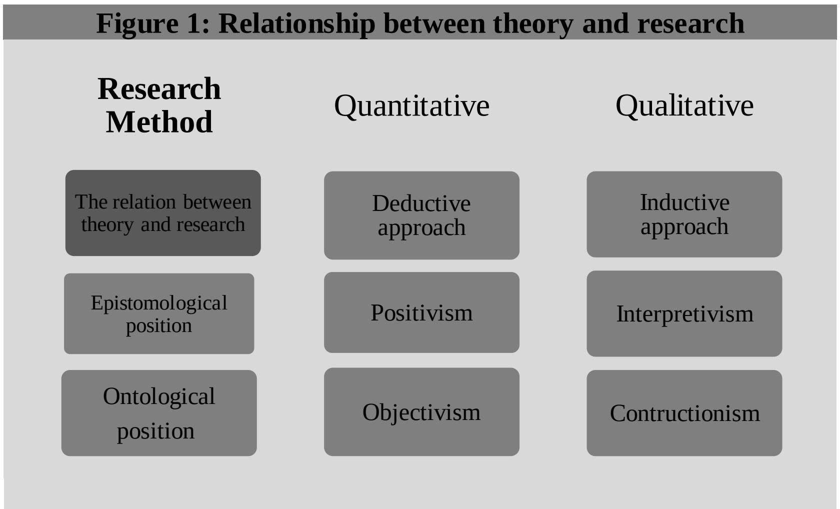

Figure 1: Relationship between theory and research. Adapted from Bryman and Bell, (Bryman & Bell, 2011, p. 27).

We will conduct our research through a time series design which is a quasi-experimental design. This research design is commonly used in finance and accounting to test for correlation between dependent and independent variables through ordinary least square (OLS) methods. Times series will be used to measure the relationship between different variables across time. This done through multiple regression techniques, the relationship look as follows

$$D = b_0 + b_1 I_1 + b_2 I_2 \dots b_k I_K + \varepsilon$$

We will try explaining the dependent variable D with independent variables I, the coefficients b_k will be estimated from data, the errors in the regression is given by ε (Ryan et al, 2002, p.127). As described earlier we aim to test whether a Halloween effect exists in our chosen industrial sectors, to do this we will test whether there are significant differences between the summer- and winter periods in terms of average monthly return.

In our time series design we utilize dummy variables together with the market premium as our independent variables in different regressions to explain the return of the index which is our dependent variable. The dummy variables will test whether the average mean of the winter period is significant. If the mean of the winter period is significant then it indicates that the winter period has significantly higher return than the summer period and thus the Halloween effect exists.

2.6 Selection and criticism of sources.

While conducting this research we have focused on having high criticism of sources and to provide relevant literature. The article "*The Halloween indicator, Sell in May and go Away: Another Puzzle*" by Sven Bouman and Ben Jacobsen is an important article for our research which we base large part of our research upon. The authors of the article are Sven Bouman and Ben Jacobsen. Sven Bouman is a portfolio manager at Aegon Asset management (Hubert, 2000) and Ben Jacobsen is currently a finance professor at Massey University in New Zealand. Ben Jacobsen have previously worked at University of Amsterdam and Erasmus university of Rotterdam in Netherlands and has written five books on investments as well as published more than 30 articles (Massey University, 2013). The article by Bouman and Jacobsen (2002) is the first article that confirmed the anomaly. The article is the only research paper that we have seen that independently includes and confirm the Halloween effect for the Swedish market. By independently we mean that Ben Jacobsen in his later research paper *"Halloween effect in US sectors"* commented upon whether the Halloween effect still existed in the Swedish market among others but did not further researched it for other countries than for United States. The article mentioned is another important article for our research which is written by Ben Jacobsen, together with Nuttawat Visaltanachoti, which is also a professor at Massey University. We feel that the articles discussed above are highly reliable, based upon the merits of authors especially Ben Jacobsen. Additionally, we feel that the rest of our included literatures are also reliable. All literature used in this research have been retrieved from scientific journals and databases provided through Umeå university library. The data selected for quantitative research where directly retrieved from Thomson DataStream provided by Umeå University.

2.7 Summary of our theoretical research methodology

The different parts of our theoretical research methodology can be summarized down to the following points:

- In this thesis we will analyze how the Halloween effect in Swedish sectors manifests itself in Swedish sectors.

- The ontological position taken in this thesis is **objectivism**. We will view reality as something independent of the actions of social actors.

- We will have a **positivistic** view on knowledge, which is our epistemological position.

- The thesis will be conducted through a **deductive research approach.**

- We will use a **quantitative research** strategy which will derive its findings through **time series analyses**.

- Scientific articles and academic literature available through Umeå university library is primary used.

In Chapter 4 we will present our practical methodology, which will present our chosen sectors and other factors used in our quantitative models. We will also in more detail present the steps taken in our research as well as explaining how we utilized the previous research models to derive our results.

3. THEORETICAL FRAME OF REFERENCE

In this chapter the reader is provided with previous research related to our study, this will give understanding on the previous research that serve as basis for our research. Secondly, we will briefly explain certain theories and concepts to allow the reader follow our empirical data result and analysis chapter.

3.1 Previous research on the Halloween effect

First evidence of the Halloween effect

Bouman and Jacobsen (2002) analyzed the Sell in May effect in their paper "*The Halloween Indicator, "Sell in May and Go Away": Another Puzzle*", the Sell in May effect is another term for the Halloween effect. Their study covered 37 countries and found evidence for the Sell in May effect in 36 countries including Sweden (Bouman & Jacobsen, 2002, p. 1618). The data consists of compounded monthly stocks return based upon MSCI indices for the period between 1970-1998 (Bouman & Jacobsen, 2002, p. 1620).

Bouman and Jacobsen (2002) found differences between summer and winter period in terms of average returns, these tended to be very large and significant for the most countries. They found that the returns for the summer period tend to be close to zero for many countries. In Europe it was only Denmark that had a return above 2% during May-October. During their research period the winter period the return was above 8% for all European countries (Bouman & Jacobsen, 2002, p. 1622).

These results are economically significant, however they regard that it's more important to test whether the results are statically significant (Bouman & Jacobsen, 2002, p. 1621). Bouman and Jacobsen found from regression analysis that the Sell in May effect where significant for 20 of the 37 countries at 10% level and significant at 1% level for 10 countries (Bouman & Jacobsen, 2002, p. 1622). In the case of Sweden, their result show that the Sell in May effect is significant at 1% level.

Table 2: Summary statistics for Sweden				
		t-values		
Observations	α	Sell in May dummy	Adjusted Sell in may dummy	January dummy
344	2,17	3,32	2,60	3,33

Table 2: Summary statistics for Swedish market adapted from Bouman and Jacobsen (2002)(Bouman & Jacobsen, 2002, p.1622).

The January effect is a well-known anomaly which attempt to explain the higher returns during January months than the remaining months. As the Halloween effect consist of the period November to April which include January month, it is natural to question whether the January effect contribute to the higher returns during winter periods. Thus it's important to test whether the Halloween effect is independent from the January effect or whether it's simply spill over from the high returns during January months. Bouman and Jacobsen (2002) extended their regression model by including a variable that will explain the January effect and readjusting the Halloween variable by excluding January month. The authors point out that this is likely to exaggerate the January effect as well as understating the Sell in May effect. The regression model assumes that the higher return in January month will be caused only by January effect and not by Sell in May effect. This will understate the Sell in May effect (Bouman & Jacobsen, 2002, p. 1627). Their results indicated that the higher returns during winter periods could not be only due to the January effect and thus rejected the idea that the Sell in May effect is simply spill over from January effect (Bouman & Jacobsen, 2002, p. 1627).

Furthermore, Bouman and Jacobsen (2002) tested whether the returns were evenly distributed during the year or whether some months tended to have higher returns. This was done by deriving the average return for the respective month of the year. For the sample, they found that May-October had below average return and the returns during August and September was especially poor, July showed varying results for the different countries (Bouman & Jacobsen, 2002, p. 1623). Bouman and Jacobsen's (2002) results are presented in the table below for Sweden, where the average returns for the different months are ranked in terms of performance.

Table 3: Average monthly return in Sweden											
Best Preforming months											*Worst preforming months*
Jan	***Jul***	***Feb***	***Mar***	***Nov***	***Dec***	***Apr***	***Maj***	***Jun***	***Okt***	***Sep***	***Aug***
3,1	2	1,8	0,8	0,4	0,4	-0,1	-0,4	-0,6	-1,4	-2,4	-3,7

Table 3: Average monthly return for Sweden, adapted from Bouman and Jacobsen (Bouman & Jacobsen, 2002, p. 1624).

It can be seen that January and July followed by February had the highest average return while the September and August had the worst.

The next piece in the puzzle that Bouman and Jacobsen (2002) investigated was the Halloween effects presence over time. They made a sample 11 countries which had sufficient long period of data; United Kingdom had the longest period of data which range from 1694. From their sample they found that 4 out 11 were significant at 10% level and 3 out of 11 were significant at 5% level. They draw the conclusion that the Halloween effect has been present for a very long time (Bouman & Jacobsen, 2002, p. 1624).

Bouman and Jacobsen suggests a simple strategy that attempt to profit upon the higher returns during winter months. The strategy attempt to reap higher rewards by being invested in equities during November-April and Treasury bonds during May-October (Bouman & Jacobsen, 2002, p. 1630). This strategy was measured against Buy-and-hold portfolio, the results indicated that for the majority of countries the strategy performs better than a simple buy and hold portfolio. The trading strategy also shows clear signs of market timing potential (Bouman & Jacobsen, 2002, p. 1625). In addition Bouman and Jacobsen tested whether transaction cost would erase the potential benefits that a Sell in May effect provides. Their results indicate that the Sell in May anomaly remains significant despite the transaction cost (Bouman & Jacobsen, 2002, p. 1625).

Critics of calendar anomalies would argue that these are data driven and results of data mining. Bouman and Jacobsen reject the explanation of data mining for the Halloween effect, as they only tested the six-months periods that are connected to the old "Sell in May and Go Away" saying, and not all six-months periods (Bouman & Jacobsen, 2002, p. 1625).

Bouman and Jacobson (2002) found that the risk was consistent during the year when measured in standard deviation. In the case of Sweden we can see that the Standard deviation is similar for both winter and summer period but there is large differences in terms of return for the two periods.

Table 4: Risk and return for Sweden		
	Mean	***Standard deviation***
Winter period: *November-April*	29,7%	21,1%
Summer period: *May-October*	3,7%	20,9%

Table 4: Average risk and return for Sweden. The return and risk are shown in annual rates. The data have been adapted from Bouman and Jacobsen (Bouman & Jacobsen, 2002, p. 1626)

Additionally Bouman and Jacobsen (2002) measured the influence of other factors such as the role of interest rates and trading volumes connection to the Sell in May effect. The influence from these factors regarded whether central banks tend to lower interest rates winter period or raise it during summer period and thus facilitate higher returns for winter period. The other concern is that trading volumes is lower during May-October. Bouman and Jacobsen (2002) tested for these explanations but found no evidence that there would be any significant differences between the periods (Bouman & Jacobsen, 2002, p. 1627).

The authors researched also whether Halloween effect is sector specific or whether it exists in all sectors. In their research they tested only for the agricultural sector, as they believed it to be the one where the Halloween effect should have strongest impact. They found however none evidence that the agricultural sector experienced any significant Halloween effect (Bouman & Jacobsen, 2002, p. 1628).

The Halloween effect in sectors

Ben Jacobsen continued this research with Nuttawat Visaltanachoti in their paper *"The Halloween Effect in U.S Sectors*". In their paper they provide a more extensive research that focus upon the Halloween effect in the U.S sectors. Fama and French sector and industry data are used in Jacobsen and Visaltanachoti research, their research cover 17 sector portfolios (Jacobsen & Visaltanachoti, 2009, p.444).

Table 5: U.S. Sectors researched by Jacobsen and Visaltanachoti		
Food	Chemicals	Machines
Mines	Consumer	Cars
Oil	Construction	Transportation
Clothes	Steel	Utilities
Consumer durables	Fabricated products	Retail
Financials	Other	

Table 5: List of U.S sectors researcher by Jacobsen and Visaltanachoti (Jacobsen & Visaltanachoti, 2009, p.445).

Their research covered the period between July-1926 until December-2006. They start their research by testing if there have been any changes in the Halloween effects strength since Bouman and Jacobsen (2002) research for the general market. From their data set they find similar results as Bouman and Jacobsen (2002). Returns for winter periods are higher than summer periods. The average return for the general market is 9,67%, of this 6,8% are earned in the winter period and 2,88% is earned during summer periods (Jacobsen & Visaltanachoti, 2009, p. 444). It's pointed out that investors that hold the general market portfolio during summer period are still better of then staying outside the market during summer periods. The risk free interest have been 1,85% on average during summer periods which is lower than 2,88% which is the average return during summer periods. However during the last 10 years the summer returns have been negative, hence being in treasury bills would be better investment. This seems however to be isolated to U.S, for other countries Switching between equities and Treasury bills have been a profitable strategy (Jacobsen & Visaltanachoti, 2009, p. 445).

Jacobsen and Visaltanachoti (2009) found that there existed large differences between different sectors. For all sectors the winter returns was higher than summer but it is pointed out there is still large differences in the respective sector. Jacobsen and Visaltanachoti (2002) point out some sectors with noticeable differences. Below is sectors that all have negative excess returns, as the risk free rate for the research period was 1,85%. Furthermore these sectors show very large winter returns.

Table 6: Sectors with large differences between periods		
Sectors	**Summer return**	**Winter return**
Consumer durables	0,03%	7,49%
Construction	0,94%	6,57%
Clothes	1,59%	8,06%
Fabricated products	1,00%	7,88%
Mines	0,95%	8,09%
Machines	1,56%	8,71%
Steel	0,36%	7,63%
Transportation	1,39%	7,28%

Table 6: List of Sectors which had high winter return and low summer return. Adapted from Jacobsen and Visaltanachoti (Jacobsen & Visaltanachoti, 2009, p. 445).

There where however other sectors such as the Utility sector that showed equal returns for winter and summer periods; 4,44% during both periods. For some other sectors there were also small differences between summer and winter periods. What is common between the sectors that have small differences is that they cover products with short life length. These sectors were Food-, Consumer- and utility sector. These show summer returns of 4,21%, 4,48%, 4,44% and with winter returns of 6,37%, 6,57%,4,44%. Furthermore the authors point out that the opposite is true for sectors with large differences, as they cover products with longer life span such as Construction-, Steel- and Machine sectors which are showed in the table above. The authors further point out that the sectors that exhibited high Halloween effect are sectors that are correlated to the conjecture and the overall state of the economy. These sectors are heavy industry sectors such as production and raw material sectors. The sectors that performed well during summer period were consumer oriented sectors. (Jacobsen & Visaltanachoti, 2009, p. 446).

3.2 Business cycles and Seasonality

Jacobsen and Visaltanachoti (2009) made the assertion that seasonal factors could impact sectors differently (Jacobsen & Visaltanachoti, 2009, p.438). We find it important to briefly present previous research upon seasonality and business cycles that are connected to our research topic to further analyze our results.

Business cycle is a reoccurring period of expansion that is followed with a contraction of the business activity. The cycles are not periodic as the length and scope change from time to time (Siegel, 2008, p.210). Hylleberg (1992) defined seasonality as:

"the systematic, although not necessarily regular, intra-year movement caused by the changes of the weather, the calendar, and timing of decisions, directly or indirectly through the production and consumption decisions made by agents of the economy. These decisions are influenced by endowments, the expectations and preferences of the agents, and the production techniques available in the economy" (Hylleberg, 1992, p. 4).

Previous research has shown that Business cycles and seasonal cycles are related. Bealieu and Miron (1992) found in their research that the business cycle and seasonal cycles show strong correlation. Several key observations are thought to result in this strong correlation. The first quarter is low in all economic activity, summer periods show very poor performance due to vacations and the last quarter outperform due to Christmas sales (Bealieu & Miron, 1992, p. 774). Bealieu and Miron (1992) suggest that the reason that Business cycle and seasonal cycle is strongly correlated is that the underlying factors are thought to be affected by the same economic catalysts even if two cycles differ in the causing factors Bealieu & Miron, 1992, p. 787).

Philip Hans Franses and Robert M. Kunst (2007) researched whether the seasonality in production in Europe converge. Their study covers 13 countries in Europe including Sweden during the periods 1962-1982 and 1983-2002. They analyze the seasonality in terms of quarters. Franses and Kunst (2007) found through regression of the logarithmic changes in industrial production that the seasonal dummies that the first and third quarter has low production in first and third quarter. In case of Sweden for the period 1983-2002 they found that Q1: −0.005 and Q3: −0.221). This means that Q1 had a average production that was -0,5% lower than the average production during the whole year period and the Q3 had -22,1% lower production. This can be compared to Q2: 0.015 (1,5%) and Q4: 0.130 (13%) higher production than the average for the year (Franses & Kunst, 2007, p. 957). Their study could not find that the seasonality in the researched countries in Europe converge (Franses & Kunst, 2007, p. 957).

3.3 January effect

The January effect is used within our regression models and is connected to our analysis of the Halloween effect. The January effect is in similarity to Halloween effect a seasonal anomaly that produces abnormal returns during January month whereas Halloween effect produce the abnormal return for the period November to April. The relation between the Halloween effect and the January effect is thus that the Halloween effect comprises January months as its one of the months in the interval November to April. The Halloween effect is thus related to the abnormal returns in January month.

Rozeff and Kinney (1976) showed the first evidence of the January effect, the evidence covered stock market returns for equally weighted index of New York stock exchange prices, for the period 1904-74. The average return for January month was 4,5% which can be compared to the average return of 0,56% for the remaining months of the year (Rozeff & Kinney, 1976, p. 400). Since then numerous researchers have confirmed the existence of abnormal returns in different markets and time periods. The abnormal returns in January are thus not confined to US but can be found in many markets. The January effect has shown to be more frequent in small firms, the anomaly has shown to be related to the size of the firms (Keim, 1983, p. 31). Smaller firms are more likely to exhibit the January effect than larger firms. Siegel (2008) point out that from 1925 there have only been 16 years where large stocks have performed better than small stocks in January (Siegel, 2008, p. 308). Furthermore, Keim (1983) showed that the first week of trading in January accounted for more than fifty percent of the return for the whole January (Keim, 1983, p. 31). Even though the January effect have been around for a long time there is still evidence that it is still present. Haug and Hirschey (2005) made a renewed research on the January effect for the period of 1927-2004 and could confirm that the January effect still exists in the US market.

The average return for equally weighted portfolio returns was for January 6,05% and 0,91% for the other months (Haug & Hirschey, 2005, p. 4).

The January effect is still being referred to as an anomaly as there has been no definite explanation for the January effect. Several hypotheses attempt to explain the anomaly; Tax-loss selling hypothesis, Window dressing hypothesis, Insider trading hypothesis and the seasonality of risks and returns hypothesis (Stark et al, 2006, p.3050). According to Starks, Yong and Zheng (2006) the most popular explanations for the January effect is the Tax-loss selling hypothesis and Window dressing hypothesis. These two hypotheses are caused mainly by institutional investors (Stark et al, 2006, p.3050). The Persistence and the occurrence in so many markets around the world have led researchers to believe that the January effect is caused due to an underlying institutional problem (Bergh & Wessels, 1985, p.515). This institutional problem could be the explained through the tax-loss selling hypothesis, which suggests that investors who have had negative returns during the year will attempt to create a tax shield by selling of stocks with negative returns. When investors sell of their poorly performing stocks they will create a downward pressure on the stock prices, the prices will then rebound in January as the prices gets balanced out when buyers act on the low prices caused in December. The result is the abnormal returns in January month (Bergh & Wessels, 1985, p.517).

The effect of the tax-loss selling is more commonly seen in small firms as they are more volatile and thus fluctuate more in price (Bergh & Wessels, 1985, p.515). Stark, Yong and Zheng (2006) point out that the tax-loss selling hypothesis is one of the most prominent explanations for the January effect, there have however studies that reject the hypothesis. It’s pointed out that the optimal strategy for investors should be to take capital losses directly and not wait until end of the year to sell of poorly performing stocks, this would imply that there are no reason for the abnormal returns in January as the tax-loss selling effect would thus be even distributed over the year (Stark et al, 2006, p.3050). Another problem with the theory is that the January effect have been observed in periods with no taxes on capital gains which suggest that the January effect could not be solely explained by the tax-loss hypothesis. Countries that have no tax capital gains such as Netherlands still exhibit the January effect. One explanation to this could be that the stock markets are heavily integrated and thus investors from countries where capital gains are taxed could thus still influence the stock prices (Bergh & Wessels, 1985, p.516).

Musto (1997) researched the turn of the year effects upon the money market and found empirical results that suggested that commercial paper give higher yield if it will mature in the upcoming year. The implication of this finding is that an investor could earn a premium by holding a commercial paper from the last trading day of the year until the first trading day of the upcoming year. The premium is more likely to be higher if the commercial paper had higher interest and default risk. The explanation to this pattern is changes in risk described as “Window dressing”. Portfolio managers are thought under this hypothesis to change their portfolio before disclosure day by reducing the perceived risk of the portfolio; this is done by selling of risky positions before the end of the year. Under this hypothesis the trader will be out of the position until the last day of the year and could thus after the end of the year and the end of the year report repurchase the position again (Musto, 1997, p. 1563-1564).

3.4 Anomalies and the Efficient market hypothesis

Eugene Famas view of an ideal capital market is a market that allocate the ownership of an economy's capital stock efficiently and having prices that give accurate signals, by rapidly reflecting all information available. When a market fully reflects the available information it can be deemed as efficient (Fama, 1970, p. 383).

In order for a market to be efficient three conditions need to be met; *firstly*, there have to be sufficient amount of rational market practitioners that strive for maximizing profits. *Secondly*, all the market practitioners should have access to free information. *Finally*, prices need to rapidly adjust when new information is released. The information is independent from previous information and will appear randomly (Murphy, 2007, p. 58). The efficient market hypotheses thus imply that the prices seem to change randomly as a result of release of new information (Bodie et al., 2011, p. 373).

The Efficient Market Hypothesis is divided into three forms; the weak form, Semi-strong form and the strong form. EMH in its *weak form* asserts that stock prices reflect all available information which can be obtained from historical data on prices and trading volume. Hence predictions based on historical prices are done in vain. *Semi-Strong* form of the EMH goes a step further regard that all publicly available information are included in the price. *The Strong form* goes so far that all public information are included as well as information known to only insiders are also included in the price (Bodie et al., 2011, p. 375).

When the returns deviate from the normal return behavior that is expected from a model such as the Capital Asset pricing model an anomaly exists (Fama, 2008, p.1653). However findings that diverge from the expected normal does not necessary indicate a market inefficiency as the findings can indicate the underlying pricing model could be not sufficient in predicting the returns. It is thus necessary to look on the profitability of a strategy to assess whether it's a market inefficiency (Schwert, 2002, p.2). The Efficient market hypothesis has for long time been one of the most established theories in finance and been more or less accepted as fundamental truth. Over the years criticism has been raised against the model. There are plenty of anomalies that still unexplained we cover the Halloween effect and January effect in our research but there are also more challenging anomalies for the researchers to explain. Shiller (2002) points out that the researchers have not been able to explain the most basic anomaly that the excess volatility of stock prices and leaves large part of the volatility unexplained. In Schiller tested for the expected volatility by modeling the relationship between dividends and stock prices, resulting in the conclusion that the volatility was higher than the Efficient Market Hypothesis could explain (Shiller, 2002, p.87). This is challenge the foundation of the Efficient market hypothesis as part of the volatility of prices seems occurs without any reason (Shiller, 2002, p.84).

3.5 Sector rotation

Jacobsen and Visaltanachoti (2009) used sector rotation as a strategy to reap higher rewards than a buy and hold portfolio. Their sector rotation strategy build upon the idea that the production sectors are performing better during winter period and that the consumer sector is performing better during summer months (Jacobsen & Visaltanachoti, 2009, p. 452). We have chosen to explain this notion as it provides practical relevance for investors wanting to develop a strategy that capitalize upon the differences within sectors in terms of Halloween effect.

Sector rotation is supported by the idea that different sectors in the economy are not experiencing the same patterns of movements (Sasseti & Tani, 2006, p. 61). One reason for this is related to fundamentals factors such as the overall state of the economy. The different sectors are all experiencing certain market conditions differently. Certain sectors are heavily dependent on an expanding economy, in contrast to some sectors that are still doing well when the economy is in decline. Another reason for the different movement patterns in sectors is due to investors' expectations on a sectors future performance in relation to others. Systematic sector rotation capitalize on the differences between sectors by switching the positions in the portfolio frequently to capture the higher returns that different sectors have during certain conditions. Hence, the crucial issue that is determining the success of a sectors rotation is identifying and setting up rotation criteria for switching between the different sectors (Sassetti & Tani, 2006, p. 61).

3.6 Capital Asset Pricing Model (CAPM)

When patterns arise in average stock returns that can't be explained by CAPM model they are considered anomalies (Fama and French, 2008. p.1653). The CAPM model is as the name indicates a pricing model. We find it important to provide information about the CAPM to enable the reader to efficiently interpret our results provided in the empirical part. Notions such as the Beta and Sharpe ratio will be presented through our empirical part. The CAPM model has many different uses, we will however focus on presenting the uses that are most relevant for our research. The use of the CAPM can only be valid if the basic assumptions of the model are ensured.

Basic assumptions of the model (Rupert, 2004, p. 225):

1. There is equilibrium in market prices, which indicates that supply equals demand for every asset.
2. There is consensus in terms of forecasts on expected returns and risks.
3. Investors choose their portfolios optimally.
4. Market compensates for risk that is unavoidable but don't reward investors for additional risk due to not choosing their portfolios optimally.

The assumptions of CAPM indicate that all investors hold risk efficient portfolios consisting of a tangency portfolio and risk free assets. Hence, the market portfolio will be the same as the tangency portfolio. The Sharpe ratio for efficient portfolios should thus equal the Sharpe ratio for market portfolios (Rupert, 2004, p. 253):

$$\frac{\mu_R - \mu_f}{\sigma_R} = \frac{\mu_M - \mu_f}{\sigma_M}$$

This can be rewritten into the ***Capital Market Line (CML)*** which can calculate the excess expected return compared the risk for an efficient portfolio. The excess expected return regards the return above the risk free rate, which is also called risk premium. The CML applies only to efficient portfolios (Rupert, 2004, p. 253).

$$\mu_R = \mu_f + \frac{\mu_M - \mu_f}{\sigma_M}\sigma_R$$

μ_R	Expected excess return of a portfolio
μ_f	Rate of return on a risk free asset

μ_M	Rate of return on a market portfolio
σ_R	Standard deviation of the return on the portfolio
σ_M	Standard deviation of the return on the market portfolio

The Sharpe ratio could be described as a reward to variability measure; it measures the excess return over the amount of risk taken measured in standard deviation. The Sharpe ratio could also be described how well the investor is being compensated for the risk taken (Brealey et al, 2011, p. 191).

$$Sharpe\ ratio = \frac{Risk\ premium}{Standard\ deviation} = \frac{\mu_R - \mu_f}{\sigma_R}$$

The security market line asserts that the expected return is the result of the Beta and the market premium. Hence, the beta is a measures the riskiness of the asset as well as the reward taking the risk (Rupert,2004, p.231). This means that the expected risk premium for an asset varies in direct proportion to the market premium through the beta. This means that an asset with a beta of 0,5 will have half of the risk premium of the market and a beta of 2 will have twice as high expected risk premium as the market (Brealey et al, 2011, p.193). The SML relates to all assets while CML only is true for optimal portfolios.

The Security market line equation is:

$$\mu_j - \mu_f = \beta_j(\mu_M - \mu_f)$$

$\mu_j - \mu_f$:	Risk premium (Return of asset J minus the risk free rate)
$(\mu_M - \mu_f)$:	Market premium (Return of the market minus the risk free rate
β_j:	Beta for asset J

The beta for an asset can be estimated through regression according to the formula below, where R_j is the stock return for an asset and R_M return of the Market. The linear regression finds the best coefficient estimate for the data and thus find beta. (Rupert, 2004, p.230)

$$\hat{\beta}_j = \frac{\sum_{t=1}^{n}(R_{j,t} - \bar{R}_j)(R_{M,t} - \bar{R}_M)}{\sum_{t=1}^{n}(R_{M,t} - \bar{R}_M)^2} = \frac{Cov(R_{j,t}, R_{M,t})}{Var(R_{M,t})}$$

This is the same as taking the covariance between stock returns and the market returns divided by the variance of the market to get the beta estimate.

4. PRACTICAL METHODOLOGY

In this chapter we will provide the necessary practical steps done that have led to our results in our empirical section. First, the chapter will present our chosen sectors and other data needed in our testing process. Second, the steps taken that have led to our results are presented as well as the equations used. Lastly, we will present criticism to our chosen methodology and the quality criterions.

4.1 Data collection

In our analysis of the general market index we chose to use the MCSI Price Index as it provided the longest sampling period for the general market index, with average monthly closing prices for the period December 1969 – December 2012. Additionally our choice of index is in line with previous research, Bouman and Jacobsen (2002) used the MCSI indices in their research (Bouman & Jacobsen, 2002, p. 1620).

The data sample for our sectors consists of FTSE sector indices which provided longest time period available through Thomson Data stream. We limited our research to cover the 9 different indices stated in *table 7* below. In *Appendix 2*, we have included a list of the total number of sector indices that are available through Thomson Datastream. However, there were large inconsistencies of the available data for the different indices. The majority of indices had limited data and thus would have led to vast differences between the research periods for the different sector indices. We regarded that the accuracy of our research could not be guaranteed using these sectors, hence we decided to only use indices that had consistent time periods. In *section 4.4* we discuss possible criticism against our chosen methodology. We have retrieved the data based upon monthly averages for our indices; this data was retrieved from Thomson DataStream.

Table 7: FTSE Sweden sector indices, January 1994 – April 2013

		The sector index covers:
1	**Industrials** *FTSE SWEDEN INDUSTRIALS*	Electronic and Electrical Equipment, Industrial Engineering, Industrial transportation, Support services, Construction and materials,
2	**Forestry and paper** *FTSE SWEDEN FORESTRY & PAP*	Forestry and Paper
3	**Financials** *FTSE SWEDEN FINANCIALS*	Banks, Nonlife insurance, Life insurance, Real estate, Financial services, Equity investment instruments
4	**Consumer services** *FTSE SWEDEN CONSUMER SVS*	General retailers, Media
5	**Consumer goods** *FTSE SWEDEN CONSUMER GDS*	Auto parts, Food producers, Household goods, Leisure goods, Personal goods, Tobacco

6	**Construction & materials** *FTSE SWEDEN CON & MAT*	Construction and material
7	**Basic materials** *FTSE SWEDEN BASIC MATS*	Chemicals, Forestry and Paper, Industrial metal, Mining
8	**Technology** *FTSE SWEDEN TECHNOLOGY*	Technology hardware and Equipment .
9	**Healthcare** *FTSE W SWEDEN HEALTH CARE L*	Healthcare equipment and Services, Pharmaceuticals and Biotechnology.
	General market Index *FTSE W SWEDEN*	

Table 7: Listing our chosen Sector indices based on data retrieved from Thomson DataStream.

Our research aims to further identify the Halloween effect in Swedish sectors by testing whether the Halloween effect is isolated to specific sectors or market wide. We will thus use this set of different sectors to pinpoint which sectors that show higher Halloween effect. We will also further analyze if there is any pattern to which sectors that show higher Halloween effect and compare against the results of previous research. Jacobsen and Visaltanachoti (2009) results show that the Halloween effect is most present in heavy industry sectors and raw material sectors that have strong correlation to the conjecture (Jacobsen & Visaltanachoti, 2009, p.446). Industrial, Forestry and paper, Construction materials, Basic materials and Technology fit into this description. In contrast Jacobsen and Visaltanchoti (2009) found also that consumer oriented sectors have a marginal Halloween effect and generally perform well during summer periods. In our sample the sectors that are consumer oriented are thus Consumer services, Consumer goods and Health care sector. Financial sector is hard to classify into one of these sectors as it fits in some regards into both categories. We will include it in our sample but we will not make any assumptions in regard to Jacobsen and Visaltanachoti (2009) idea.

Risk free rate

A risk free asset can be defined as default free perfectly indexed bond that offers a guaranteed rate over an identical period to the investor's desired holding period. The Treasury bill assumed to fulfill the requirement of being a risk free rate (Bodie et al., 2011, p. 198). Hence, we choose to use one Swedish one month Treasury bill for our chosen time period 1994/01-2013/04. In *Appendix 1* we have included a figure showing the Risk free rate for our chosen research period. The figure is showing the Swedish One month maturity Treasury bill with annual rates. The data for our risk free rate are retrieved from Thomson Datastream.

4.2 Methodology

In our research we will use models developed by previous researchers; Bouman & Jacobsen, Jacobsen & Visaltanachoti.

Bouman & Jacobsen (2002) developed a method for testing the presence of the Halloween effect. Statistical regressions were used according to the formula below:

Equation 1: $r_i = \mu + \alpha_1 Hal_t + \varepsilon_t$

r_i:	Return for the index
μ:	Intercept
α_1:	Coefficient estimate
Hal_t :	Dummy Variable for Halloween effect
ε_t :	Error term

The dummy variable Hal_t takes the value of 1 during November to April and value 0 during May-October. The regression measures whether the returns during the period November to April are different from the period May-October. Without the dummy variable the equation is a random walk model (Bouman & Jacobsen, 2002, p. 1621).

$$Hal_t = \begin{cases} 1: & November, December, January, February, Mars, April \\ 0: & May, Juni, July, August, September, October \end{cases}$$

The first step is to compute the continually compounded returns also known as Logarithmic returns for each month in the respective index. This is done according to the equation below (Rupert, 2004, p. 76).

$$r_t = log\left(\frac{P_t}{P_{t-1}}\right) = log(1 + R_t)$$

Due to the structure of the dummy variable the regression becomes a simple mean test, which tests whether the mean return for November to April is higher than the mean return for the period April to October. If the mean is higher for November to April this is indicated by the coefficient estimate α for the dummy variable being positive and significant. If positive this coefficient will indicate the excess return for the winter period, if negative the opposite the excess return for the summer period over the winter period. We will use the P-values in our hypothesis testing. The P-value shows the smallest significance that the null hypothesis could be rejected for (Rupert, 2004, p. 63). Bouman and Jacobsen regarded findings that had a significance level up to 10% as significant (Bouman & Jacobsen, 2002, p. 1622). Hence, we will regard P-values < 0,1 as significant. The intercept μ gives the index return when the dummy variables are zero which is the period May-October. The p-value for the intercept thus test whether intercept μ is significantly different from zero; $H_0: \mu = 0$, $H_1: \mu \neq 0$. Low p-value will thus indicate that the intercept is significantly different from zero and high p value that it's not (Kleinbaum et.al., 2008). The intercept is not part of the hypothesis testing but will provide some additional information about the returns for the period May-October.

Bouman & Jacobsen (2002) recognized that January tended to give high returns for many markets, which could be explained by the well-known anomaly January effect. Hence, Bouman and Jacobsen included this explanation in their model by including another dummy variable in their formula to test whether the Halloween effect is still statistically significant when adding another dummy variable which account for the January effect. As mentioned earlier, adding another dummy variable for January month is likely to exaggerate the January effect and to understate the Halloween effect. The new regression model will assume that the higher return in January month will be caused only by January effect and not by Halloween effect, which will understate the Halloween effect (Bouman & Jacobsen, 2002, p. 1627).

In the formula below the dummy variable for January effect is Jan_t , which equal to 1 during January month and 0 during the other months. The dummy variable Hal_t^{Adj} for Halloween effect will be adjusted by excluding the January month. Another coefficient α_2 estimate for the January effect will be regressed; this coefficient will be treated similar to the coefficient estimate for the Halloween effect. If positive and significant we can regard that the index experience a significant January effect.

Equation 2: $r_t = \mu + \alpha_1 Hal_t^{Adj} + \alpha_2 Jan_t + \varepsilon_t$

In addition to the regressions presented above we will use an additional regression when analyzing our sectors. We will follow the methods from the research done by Jacobsen & Visalatanachoti (2009). In their research they measure whether the Halloween effect outperform the market returns in accordance to the formula below.

Equation 3: $r_t^s - r_t^f = \mu + \alpha_1 Hal_t + \alpha_2 Jan_t + \beta\left(r_t^m - r_t^f\right) + \varepsilon_t$

r_t^s :	*Return*
r_t^f :	*Risk free rate*
μ :	*Intersection constant*
α_1, α_2 :	*Coefficient estimates*
Hal_t, Jan_t :	*Dummy variables for Halloween effect and January effect*
$\beta\left(r_t^m - r_t^f\right)$:	*Beta and market premium*
ε_t :	*Error term*

The excess return is derived by subtracting the return of the different sector index with the risk free rate. The excess market return are derived by subtracting risk free rate from the market return, this is the market premium. The regression will attempt to explain the excess sector return with the Market premium, Halloween dummy and the January dummy. We attempt to see whether the Halloween effect is still significant when compared against the market returns.

4.3 Reliability, replication and validity criterion

The notion reliability of a study refer to what extent a study is free from bias as well as how stable the results are when the study is repeated over time (Sekaran, 2003, p. 203). Reliability is an important criterion for quantitative research. The reliability criteria conclude whether a measurement is stable in time and when done on a different dataset (Bryman & Bell, 2011, p. 41). Our models build upon previous research, which on their hand have been replicated and tested by other researchers. We have based our research to a large extent on the article *"Halloween indicator, "Sell in May and Go Away": Another Puzzle".* The models used in this article have been adopted and replicated by other researchers for different data set e.g. Jones & Lundstrum (2009), Lucey & Zhao (2008). We regard that the article have been heavily scrutinized and hence should on itself provide a high reliability criterion. Our research follows the methods and models used in this article, thus the same should be true for our research in terms of reliability.

The replication criteria relates to which extent the research could be repeated by other researchers (Bryman & Bell, 2011, p. 41). As explained in the paragraph above, our research builds heavily upon previous research. We have explained in the section *3.1 Previous research,* what findings and conclusions previous researchers have derived. Additionally in this chapter we have explained the methods used in our research which is based upon the methodology that previous researchers have produced. Furthermore, we have specified which data have been used and for which periods. We are confident that future research could replicate our research based upon the information provided in our thesis.

Validity criterion regards the integrity of the conclusions that are drawn from the research (Bryman & Bell, 2011, p. 42). The Validity criterion could be divided into two different forms; internal validity and external validity. Internal validity is especially important for our type of research as financial models commonly work from the assumption that there is a relationship between certain variables (Bryman & Bell, 2011, p. 42). We believe that our validity criteria is high as we are not assuming that there is relationship between e.g. Halloween- and January effect rather statistically test the significance. Additionally we are not making any assumptions that are not supported by previous research and well known financial models.

The next form of the Validity criterion is the external validity, which deal whether the results could be transferred beyond the frames of the study (Bryman & Bell, 2011, p. 43). In this respect our research are aiming to provide high degree of external validity as we can only draw conclusion for our sample which is the Swedish stock market. We will not attempt to generalize our findings for other stock markets; however we hope we can provide a piece in the puzzle to explain how the anomaly manifests itself. By finding whether it’s a sector specific anomaly or a market wide will allow us to comment upon the nature of the anomaly and thus provide in that respect some external validity.

4.4 Criticism against chosen methodology

There are a few issues with the chosen methodology that we have noticed while conducting this research. Our Sector indices are broader than the sectors that Jacobsen and Visaltanachoti (2009) researched this can be seen by Comparing *Table 5* and *Table 7.* Our set of sectors cover most of the Sectors that Jacobsen and Visaltanachoti (2009) researched but are included in broader sectors such as industrials and consumer goods instead of being separated. Hence our set of sectors is not optimal for comparison against previous research. Jacobsen and Visaltanachoti (2009) found that sectors that cover sectors with short life span tend to have small differences between summer and winter and sectors that cover products with longer life span tend to have larger differences between winter and summer periods i.e. larger Halloween effect. Jacobsen and Visaltanachoti found that consumer oriented sectors such as Food and consumer products as well as utilities tend to have low or marginal Halloween effect. Raw materials and production sectors such as Construction, steal and machines tend to have a large Halloween effect (Jacobsen & Visaltanachoti, 2009, p.446). In our sample of sectors we are not however covering many sectors with products that have short life span. This is due to problem finding available data that cover sectors. The data used in Jacobsen and Visaltanachoti's research are only available for the U.S. market. To our understanding there exists no similar data for the Swedish market. This data that are used by Jacobsen and Visaltanachoiti are time consuming to produce. We would properly not able to produce similar data considering the time span of the research. In our sample of sectors the sectors that fit Jacobsen and Visaltanachoti's (2009) description of products with short life span are Consumer goods, Consumer services and Healthcare sectors. In addition we believe that a longer research period could have been an improvement of our research. Due to limitation of data we had to limit our self to the research period Januari-1994 until April-2013. Jacobsen and Visaltanachoti (2009) used data for the period July 1926- December 2006 which is considerably longer than our time span.

4.5 Heteroscedacity and autocorrelation within our models

The Breusch-Pagan Test

Linear models assume that the variance is constant, if the variance is nonconstant then the problem of heteroscedacity appears. Heteroscedacity can cause problems with standard errors and confidence limits (Rupert, 2004, p. 200). To formally test for heteroscedacity the Breusch-Pagan test can be used for testing linear regression models. The model proposes that the error variance can be explained by the explanatory variables (Bruesch & Pagan, 1979, p. 1288).

$$\sigma_i^2 = h(\alpha_i + \alpha_2 x_{i2} + \alpha_3 x_{i3} + \cdots + \alpha_K x_{iK})$$

The test works for linear models such as the one below.

$$Y_i = \beta + \beta_2 x_{i2} + \cdots + \beta_k x_{iK} + \varepsilon_i$$

Furthermore the model assumes that the error variances are different for every observation $\mathrm{Var}(e_i) = \sigma_i^2$ i=1,2,3..,N

When the coefficient estimates for the explanatory variables are zero: $\alpha_2 = \alpha_3 = \cdots = \alpha_K = 0$. The model will be homoscedastic. (Bruesch & Pagan, 1979, p. 1288)

The test will thus be:

H_0: $\alpha_2 = \alpha_3 = \cdots = \alpha_K$ The model is Homoscedastic

H_1: All coefficient estimates α_i are not zero. The model is Heteroscedastic

The variance σ_i^2 is the same as the squared residuals $\hat{\boldsymbol{e}}_i^2$ of the linear regression. Thus in our different equations 1-3 we save the residuals for each sector. The residuals are then squared in order to obtain the variance. Next step in the test process is to use the variance that we derived as the dependent variable in an new regression to derive the R^2.

$$\hat{e}_i^2 = \beta + \beta_2 x_{i2} + \cdots + \beta_k x_{iK} + \varepsilon_i$$

The R^2 from the above equation will be used to retrieve the significance of the equation According to: Number observations * R^2 .

The value obtained will be then compared to the Chi-square distribution with degrees of freedom -1. Appendix 5-8 we have included the test for heteroscedacity for the respective hypothesis that we used. The result from the Breusch-Pagan test showed clear evidence for the variance being constant in our models i.e. homoscedastic.

Autocorrelation

In linear regression models it's assumed that the error terms are independent, this assumption is violated when autocorrelation exists in the model. Autocorrelation exists when the errors are dependent on past errors (Anderson et al.,2011, p.750). In Appendix 9-13 we have presented the auto-correlograms for the residuals for respective regression run in SPSS. We can see that the autocorrelation tend to be insignificant, however for few regressions there seem to be marginal autocorrelation in the models. We consider that autocorrelation should not have any significant impact in our models.

5. EMPIRICAL RESULTS

Our Empirical chapter will start with presenting our hypotheses that we will use in our research to ultimately answer our research question. The results for the general market presented first are then followed by the results for the sectors. The last part covers strategies that attempt to profit on the Halloween effect.

5.1 Hypothesis testing

As specified in the previous chapter we will utilize hypothesis testing for the regression equations: 1-3 in order to answer our research question. The hypothesis testing will test whether the coefficient estimate α is positive and significant, which enables us to reject the null hypothesis. If our null hypothesis is rejected then we can conclude that the returns for the winter period are significantly higher than the summer period and if the null hypothesis is accepted the Halloween effect is not statistically significant.

We have specified the research questions in *section 1.2, Table 1,* where we have also provided explanations what we aim to research. Below is the research question that we presented in our introduction chapter, we will attach hypotheses to our research question in order to test and answer it. The hypotheses are divided into the general market and the sectors as we first want to test whether the Halloween effect exists in the general market before continuing analyzing the Halloween effect in our different industrial sectors.

Research question:

Is the Halloween effect isolated to specific sectors or present market wide?

Table 8: Hypothesis testing for the general market	
H_0= The Coefficient estimate α is negative and not significant H_1= The Coefficient estimate α is positive and significant	P-value > 0,1 P-value < 0,1
Hypotheses	
1.1 Is the Halloween effect for the general market statistically significant?	
Regression: $r_i = \mu + \alpha_1 Hal_t + \varepsilon_t$	Equation 1
1.2 Is the Halloween effect for the general market statistically significant when the January effect is included?	
Regression: $r_t = \mu + \alpha_1 Hal_t^{Adj} + \alpha_2 Jan_t + \varepsilon_t$	Equation 2

Table 8: Attached hypotheses to research question 1. We will test whether α_1 is positive and significant at 10% level for the general market index. We have followed the methods for testing developed by Bouman and Jacobsen (2002).

Table 9: Hypothesis testing for the sectors	
H_0= The Coefficient estimate α is negative and not significant H_1= The Coefficient estimate α is positive and significant	P-value > 0,1 P-value < 0,1
Hypotheses	
2.1 Is the Halloween effect statistically significant in the respective sector?	
Regression: $r_i = \mu + \alpha_1 Hal_t + \varepsilon_t$	Equation 1
2.2 Is the Halloween effect statistically significant when the January effect is included?	
Regression: $r_t = \mu + \alpha_1 Hal_t^{Adj} + \alpha_2 Jan_t + \varepsilon_t$	Equation 2
2.3 Is the Halloween effect statistically significant against market returns?	
Regression: $r_t^s - r_t^f = \mu + \alpha_1 Hal_t + \alpha_2 Jan_t + \beta\left(r_t^m - r_t^f\right) + \varepsilon_t$	Equation 3

Table 9: Attached hypotheses to research question 2. We will test whether α_1 is positive and significant at 10% level for the respective sector index. The procedures above are done in similarity to Bouman & Jacobsen (2002), and Jacobsen & Visaltanachoti (2009).

5.2 Halloween effect in the general market

To answer our research question we will start by testing whether the Halloween effect is still present in the Swedish stock market. Bouman and Jacobsen (2002) found that the Halloween effect was present in Swedish market but their research period ranged until 1998, hence we want to see whether there have been any changes during the years since then. Firstly we will test the period 1969-2012 to see whether the Halloween effect is still statistically significant. Then we will test the period 1998 to 2012 in order to compare the results to the longer period.

We will use the regression below developed by Bouman and Jacobsen (2002) to firstly test whether the Halloween effect on itself is statistically significant without taking the January effect into account.

Equation 1: $r_i = \mu + \alpha_1 Hal_t + \varepsilon_t$

This is followed by a regression where the Halloween effect is tested independently from the January effect. This is done in the formula below where the dummy variable $\boldsymbol{Jan_t}$ has been added.

Equation 2: $r_t = \mu + \alpha_1 Hal_t^{Adj} + \alpha_2 Jan_t + \varepsilon_t$

Table 10: Halloween effect for the general market index						
	Intercept μ	***P-value Intercept***	***Halloween dummy*** $\boldsymbol{\alpha_1}$	***P-value Halloween dummy***	***January*** $\boldsymbol{\alpha_2}$	***P-value January dummy***
1969-2012						
Equation (1)	0	0,843	0,010	0,001	-	-
Equation (2)	0	0,843	0,011	0,001	0,006	0,296
1998-2012						
Equation (1)	-0,004	0,168	0,012	0,008	0,008	-
Equation (2)	-0,004	0,168	0,014	0,003	0,003	0,762

Table 10: Results from the regression and hypothesis testing specified in table 6. Equation 1: $r_i = \mu + \alpha_1 Hal_t + \varepsilon_t$ *, Equation 2:* $r_t = \mu + \alpha_1 Hal_t^{Adj} + \alpha_2 Jan_t + \varepsilon_t$

In Bouman and Jacobsen's (2002) research they found that the Halloween effect was significant at 1%. In *Table 2*, the summary statistics for Swedish market are presented. The t-values are all significant at 1% significance. We find similar results to Bouman and Jacobsen for our two periods 1969-2012 and 1998-2012 which both are significant at 1% level, p-value of < 0,01 both with the January and without the January. The Halloween α for the respective regression indicate the excess average monthly return for the winter over summer period. We can see that for the period 1969-2012 the excess average monthly return without January effect dummy where 1% and with the January effect dummy 1,1%. For the period 1998-2012 the excess returns where slightly higher 1,2% without and 1,4% with the January dummy variable. The p-value for the intercept shows that the returns during May-October for the two periods are insignificantly different from zero. For the period 1998-2012 the returns during May-October have on average been -0,4%.

In order to test whether the Halloween effect is still present in the general market we have attached two hypotheses.

1.1 *Is the Halloween effect for the general market statistically significant?*
1.2 *Is the Halloween effect for the general market statistically significant when the January month is included?*

The positive and significant coefficient estimate α for both equations and time periods indicate that we can reject our null hypothesis for both the hypotheses 1.1 and 1.2.

5.3 Halloween effect in the sectors.

Our data show evidence of the presence of the Halloween effect in the general market. Next, we will test whether the effect seems spread over the different sectors or whether it's concentrated to certain sectors.

We will start the analysis of the sectors by deriving the average returns for the different sectors. This is done through continuously compounded return for the respective month according to the *section 4.2*. The returns are then separated into summer and winter period. The average return is then calculated for the full year period, winter and summer period. The monthly average returns are then annualized by multiplication of the monthly return with square root of 12 to get the annual rate as we feel as it make comparisons between sectors easier. In addition we have added the general market index as well as the risk free rate in order to make comparisons. Which have been calculated in same way as the returns for the respective sector index.

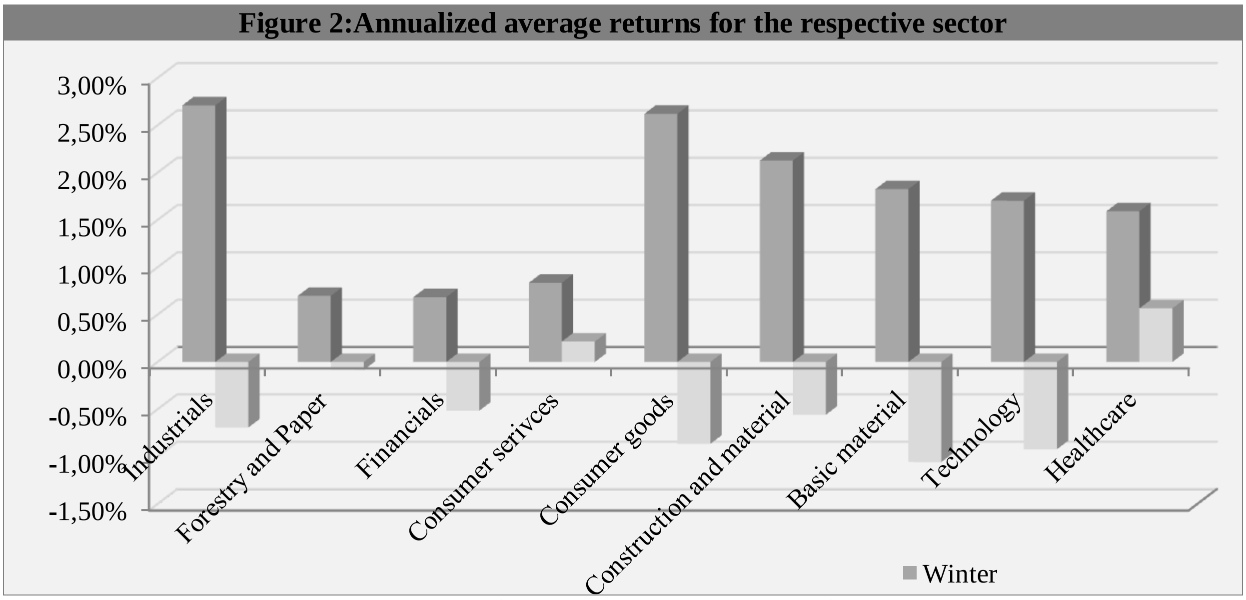

Figure 2: Annualized average return for the respective sectors for winter period Nov-April and for summer period May-October.

The annualized returns for the respective sector show that there are large differences between the winter and summer periods which indicate support for the Halloween effect. Only two sectors had positive summer returns; Consumer services and Healthcare. In addition we can see that we find similar results as Bouman and Jacobasen (2002) in terms of negative excess returns during summer periods. Excess returns are the return of the asset minus the risk free rate. The risk free rate for the summer period was in average 0,99% subtracting that for the respective index will give negative excess returns as the returns tend to be negative or close to zero. The risk free rate is higher than the return for all sectors during summer periods.

	Table 11: Annualized average returns				
		Full period	*Winter*	*Summer*	*Beta*
	Risk free rate	***0,98%***	***0,98%***	***0,99%***	-
1	*Industrials*	1,03%	2,71%	-0,69%	0,89
2	*Forestry and paper*	0,21%	0,70%	-0,29%	0,52
3	*Financials*	0,95%	2,37%	-3,95%	0,88
4	*Consumer services*	1,84%	2,90%	0,75%	0,67
5	*Consumer goods*	0,90%	2,62%	-0,86%	0,68
6	*Construction materials*	0,80%	2,13%	-0,56%	0,64
7	*Basic materials*	0,40%	1,83%	-1,06%	0,80
8	*Technology*	0,41%	1,70%	-0,92%	1,58
9	*Healthcare*	1,09%	1,59%	0,57%	0,36
10	**Index**	**0,95%**	**2,45%**	**-0,59%**	0,89

Table 11: Annualized average returns for the whole year, winter and summer period.

We will continue by researching which months tended to perform best and worst. Below is a figure showing the best and worst performing months for the average sector. We can see that the January tend to be best month followed by the other winter months. May and July are the summer months that are doing well. The worst performing months are as can be seen October, June and August. This is fairly similar to the results of Bouman and Jacobsen where they found that the months May to October are below average and August together with September being especially bad month for investments.

Figure 3: Best and worst performing months in the sectors

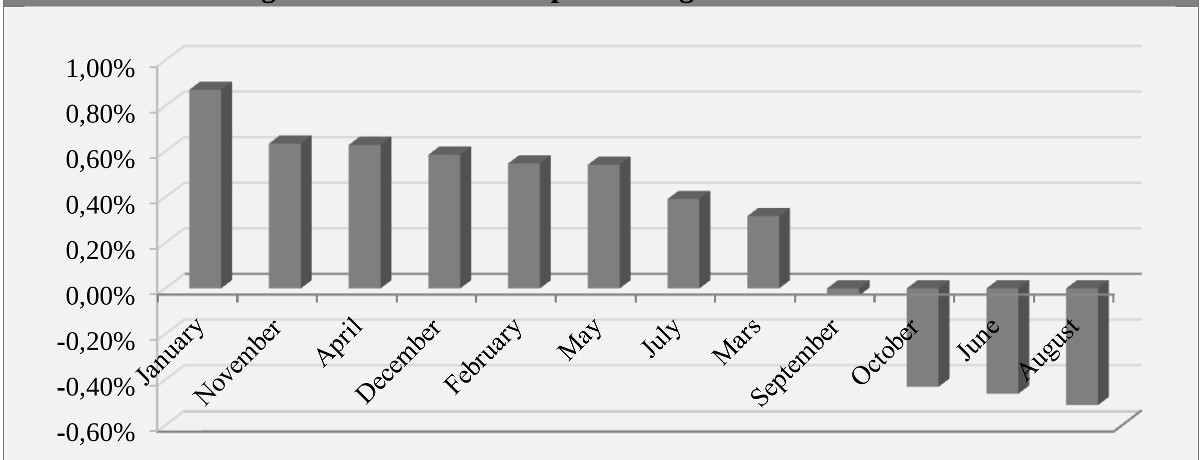

Figure 3: Best and worst performing months based upon average for all sectors, measured in average monthly return. Months are sorted in descending order in terms of performance.

In *Table 12* the returns for each month have been derived for the respective index, the months have then been sorted in *Table 13* in descending order in terms of performance. What is noticeable in these tables is that the service sector are not following the pattern of the other sectors, Healthcare have highest returns during May and Consumer service sector have second highest returns in July. This could further indicate that there seems to be some truth to the findings of Jacobsen and Visatanachoti (2009) as our consumer sectors seems to perform well during summer periods in contrast to production sectors such as Industrials, Construction & material and basic material which that have 3 winter months of highest returns. The results show that not all sectors have poor performance during the summer months Consumer service sector and Forestry and paper sector have the second highest average returns during July month. What is also noticeable is that there are large differences between which months that are having the highest returns for the different sectors. The only sector that has a summer period that is the best performing is the Healthcare sector.

Table 12: Average returns for the different sectors separated into months.

	Industrials	Forestry & Paper	Financials	Consumer services	Consumer goods	Construction & material	Basic material	Technology	Healthcare
January	0,96%	0,77%	0,53%	0,80%	1,02%	0,41%	0,86%	1,94%	0,55%
February	1,13%	-0,25%	0,09%	1,58%	1,82%	-0,22%	0,37%	0,54%	-0,12%
Mars	0,58%	0,55%	0,50%	0,75%	0,01%	0,32%	0,61%	-0,33%	-0,15%
April	0,87%	-0,03%	1,17%	0,49%	0,76%	0,69%	1,07%	-0,31%	0,95%
May	0,87%	0,45%	-0,11%	0,91%	-0,19%	0,06%	0,46%	1,23%	1,19%
June	0,39%	-1,18%	-1,01%	-0,22%	-0,63%	-0,91%	-1,28%	0,32%	0,36%
July	-0,75%	0,61%	0,79%	1,00%	0,69%	-0,01%	0,53%	0,03%	0,63%
August	0,81%	0,13%	-0,58%	-0,68%	-0,32%	-0,25%	-0,76%	-2,38%	-0,57%
September	-0,56%	0,15%	0,13%	-0,01%	-0,65%	0,70%	-0,35%	-0,24%	0,54%
October	-0,28%	-0,68%	-0,11%	0,29%	-0,39%	-0,55%	-0,44%	-0,55%	-1,17%
November	0,36%	0,00%	0,97%	0,70%	0,21%	1,19%	-0,75%	2,13%	0,91%
December	0,78%	0,20%	0,87%	0,68%	0,70%	1,35%	0,99%	-0,93%	0,65%

Table 12: Average monthly returns for respective sector.

Table 13: Ranking of the months for respective sector

	Industrials	*Forestry & Paper*	*Financials*	*Consumer services*	*Consumer goods*	*Construction & material*	*Basic material*	*Technology*	*Healthcare*
1	February	January	April	February	February	December	April	November	May
2	January	July	November	July	January	November	December	January	April
3	April	Mars	December	May	April	September	January	May	November
4	May	May	July	January	December	April	Mars	February	December
5	August	December	January	Mars	July	January	July	June	July
6	December	September	Mars	November	November	Mars	May	July	January
7	Mars	August	September	December	Mars	May	February	September	September
8	June	November	February	April	May	July	September	April	June
9	November	April	May	October	August	February	October	Mars	February
10	October	February	October	September	October	August	November	October	Mars
11	September	October	August	June	June	October	August	December	August
12	July	June	June	August	September	June	June	August	October

Table 13: Months are sorted in decending order in terms of performance for the respective sector .

Even though these findings have economic significance, what is more relevant is to test the statistical significance in order to test our different hypotheses. Firstly, we will test whether the Halloween effect is significant without the January effect dummy according to *equation 1*. This equation is the same as the equation we used for the general market index. This regression tests whether the Halloween effect is significant on itself without excluding the January effect. In order to test this we will run regression according to our test hypothesis in *table 6*.

Table 14: Results for hypothesis 2.1				
Sector	***Intercept μ***	**P-value *Intercept***	***Halloween dummy α_1***	**P-value *Halloween dummy***
Industrials	-0,002	0,460	**0,01**	**0,011**
Forestry & Paper	-0,001	0,760	,003	0,461
Financials	-0,001	0,600	**,008**	**0,037**
Consumer services	0,002	0,469	0,006	0,139
Consumer goods	-0,002	0,367	**,010**	**0,010**
Construction & material	-0,002	0,572	**,008**	**0,053**
Basic material	-0,003	0,313	**,008**	**0,051**
Technology	-0,003	0,637	,008	0,340
Healthcare	0,002	0,530	,003	0,419

Table 14: Results for hypotheses 1.1, "Is the Halloween effect statistically significant in the respective sector?" The results are derived according to Equation 1: $r_i = \mu + \alpha_1 S_t + \varepsilon_t$. The sectors where we could reject our null hypothesis have been highlighted in bold.

From the results we can see that the null hypothesis could be rejected for the majority of sectors six out of nine. The sectors which the null hypothesis where rejected for at a significance level of 10% are; *Industrials, Financials, Consumer goods, Construction & Material* and *Basic material.* Rejection of the null hypothesis indicates as mentioned previously support for the Halloween effect. We will perform the same regression as we did for the general market according to *equation 2*. This will test whether the Halloween effect is independent from January effect. The test hypotheses are stated in *table 6.* Intercept is close to zero but negative for all the sectors meaning that the returns for the months; May-october have been close to zero and negative. The P-value for the intercept show that the returns are not significantly different from zero as the intercept is close to zero.

Table 15: Results for hypothesis 2.2						
Sector	***Intercept μ***	**P-value *Intercept***	***Hallowen dummy α_1***	**P-value *Halloween dummy***	***January dummy α_2***	**P-value *January dummy***
Industrials	-0,002	0,576	**0,009**	**0,022**	**0,013**	**0,059**
Forestry & Paper	-0,002	0,561	0,005	0,181	-0,001	0,900
Financials	0,000	0,839	0,006	0,179	0,001	0,935
Consumer	0,002	0,344	0,005	0,216	0,014	0,071

services						
Consumer goods	-0,002	0,282	0,006	0,116	0,020	0,006
Construction & material	0,000	0,480	0,005	0,203	-0,002	0,738
Basic material	-0,005	0,304	**0,013**	**0,003**	**0,009**	0,259
Technology	-0,001	0,614	0,004	0,613	0,007	0,656
Healthcare	0,001	0,902	0,005	0,179	-0,002	0,726

Table 15: Results for hypotheses 2.2, "Is the Halloween effect statistically significant with the January effect?". The results are derived according to equation 2: $r_t = \mu + \alpha_1 Hal_t^{Adj} + \alpha_2 Jan_t + \varepsilon_t$

The exclusion of the January effect from the Halloween effect reduces the number of sectors that the null hypothesis could be rejected for, only two out of nine; *Industrials* and *Basic material*. Furthermore the only sectors that seem to exhibit the January effect are Industrials, Consumer services and Consumer goods sector indicated by positive $\boldsymbol{\alpha_2}$ and P-value <0,1.

The third regression we will test is when excess return of the sector is measured against the market premium return together with the previous dummy variables: $\boldsymbol{Hal_t}$ and $\boldsymbol{Jan_t}$. The intercept are positive for two sectors; Consumer services, Healthcare when the January month is excluded from the dummy variable. None of the sectors are significantly different from zero during the period May-October.

Table 16: Results for hypothesis 2.3

Sector	***Intercept*** ***μ***	**P-value** ***Intercept***	***Halloween Dummy*** $\boldsymbol{\alpha_1}$	***P-value Halloween dummy***	**January dummy**$\boldsymbol{\alpha_2}$	**P-value Jan**	**Market**	**P-value Market**
Industrials	-0,002	0,250	0,004	0,129	0,006	0,128	0,867	0
Forestry & Paper	-0,003	0,272	0,002	0,534	-0,005	0,443	0,493	0
Financials	0,001	0,754	0,000	0,992	-0,007	0,156	0,879	0
Consumer services	0,001	0,601	0,001	0,745	0,001	0,175	0,661	0
Consumer goods	0,001	0,601	0,001	0,745	0,009	0,175	0,661	0
Construction & material	0,000	0,858	0,001	0,686	-0,007	0,240	0,609	0
Basic material	**-0,005**	**0,024**	**0,008**	**0,018**	0,003	0,661	0,759	0
Technology	0,002	0,646	-0,006	0,260	0,502	0,502	1,635	0
Healthcare	-0,001	0,834	0,003	0,404	-0,005	0,425	0,333	0

Table 16: Results for hypotheses 2.3, "Is the Halloween effect statistically significant against market returns?" The results are derived according to equation 3: $r_t^s - r_t^f = \mu + \alpha_1 Hal_t + \alpha_2 Jan_t + \beta\left(r_t^m - r_t^f\right) + \varepsilon_t$

The *equation 3* aim to explain the sector returns with the winter return, January return and the market return. Hence we aim to see whether some sectors could outperform the market during winter period. Only Basic material show significant excess returns in the winter period. The coefficient estimate α_1 for the respective sector is far from significant for most sectors. Technology show negative return average returns during winter period while having positive returns during summer periods indicated by positive intercept. Adding the Market premium in the regression the intercept become more positive than negative for the sectors but all sectors are close to zero and have an intercept that is not significantly different from zero except Basic material sector, which have a significant p value for the intercept. The intercept is negative for the Basic material sector which means that the returns during summer months have been significantly negative. Another interesting finding is that none of the sectors show a significant January effect and Forestry & Paper, Financials, Construction & material and Health care sector show negative average returns during January months.

Risk and return

We derived the volatility of the returns measured in standard deviation for the respective sector index in other to further investigate whether the risk changes during the year. As we mentioned earlier we aim to see whether there is changes in risk during the year which could indicate changes in investment behavior during the year. If there are changes in risk behavior would thus be seen as support for a market wide anomaly and if consistent risk would then be support against the idea of changes in investment behavior.

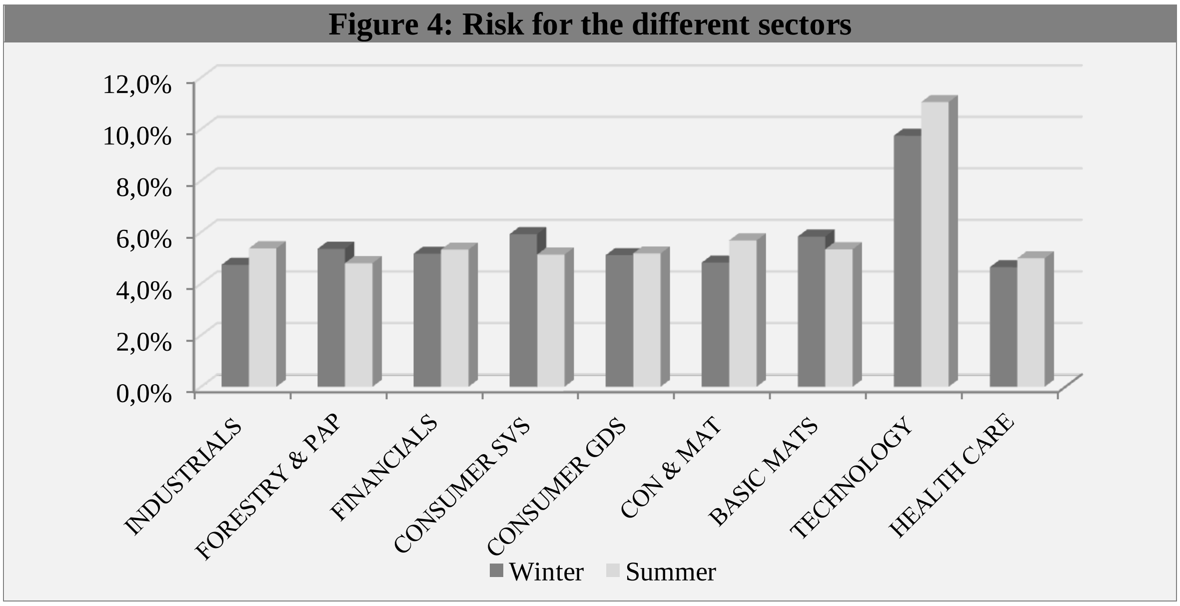

Figure 4: Showing the risk measured in standard deviation for the respective sector in annual terms.

Table 17: Risk and return						
Sectors	***Average return***		***Average standard deviation***		***Sharpe ratio***	
	Winter	*Summer*	*Winter*	*Summer*	*Winter*	*Summer*
Industrials	0,50%	-0,49%	1,90%	2,20%	0,26	-0,22
Forestry and paper	-0,08%	-0,37%	2,20%	2,00%	-0,04	-0,19
Financials	0,40%	-0,43%	2,10%	2,20%	0,19	-0,20
Consumer services	0,56%	-0,07%	2,40%	2,10%	0,23	-0,03
Consumer goods	0,48%	-0,54%	2,10%	2,10%	0,23	-0,25
Constrution and material	0,33%	-0,45%	2,00%	2,30%	0,17	-0,19
Basic material	0,25%	-0,59%	2,40%	2,20%	0,10	-0,27
Technology	0,21%	-0,55%	4,00%	4,50%	0,05	-0,12
Health care	0,18%	-0,12%	1,90%	2,00%	0,10	-0,06

Table 17: Risk and return for the respective Sector index. The risk is shown in average monhtly standard deviation. The average return are also presented in monthly rates.

This has been done in similarity to Bouman and Jacobsens (2002) research. What we can see from the results is that the risk seems to be evenly distributed for the whole year in the respective sector. By looking at the graph we can see that the standard deviations are similar during both winter and summer period for the different sectors. Sharpe ratios have derived to further examine the connection between the amount of risk taken and the compensation for it in terms of excess return. It can be see that the different sectors have higher reward to variability during the winter period. The risk measured in standard deviation is roughly similar for both periods but the excess returns during summer periods are for all of the sectors negative, which result in the negative Sharpe ratios during summer periods

5.4 Strategies based on Halloween effect

Jacobsen and Visaltanachoti (2009) used a sector rotation strategy which invests in production sectors during the winter and consumer sectors during summer period. Our empirical result for our sectors show that in most cases it would be better to keep Treasury bills during summer periods than investing in any of the sectors thus we will rather use Bouman and Jacobsens (2002) strategy. This strategy suggest that the investor should be invested in the general market index preferably through a passive index fund during winter period Nov-April and then during summer months being invested in Treasury bills. This strategy is compared in the figure below against; being in the market during the whole year and the opposite of the strategy, being in the market only during the summer. Risk free rate is also plotted in the graph. The graph shows the cumulative returns for the respective investment. The figure is derived from the returns of FTSE general market index.

What can be seen is that the strategy seems to perform very well against the other investment options. The strategy seem to be in some sense time specific, during 1994-2000 the strategy are not performing any better than the Buy and Hold portfolio. However this strategy could be beneficiary during periods of severe downturn in the market as the risk is lower, as the investor is only in the market half of the year (Jones & Lundstrum, 2009, p. 110). Treasury bills are considered risk free hence being only invested in the market half of the period should lower the total risk. The global financial crisis which started during 2008 is an example that can be seen in the figure, the suggested strategy seem to avoid the largest downturns in the market. The Buy-and-hold portfolio dropped heavily in 2008 while the suggested strategy seems rather unaffected. The heavy drops in the Buy and hold portfolio seem to be isolated to the summer periods. Furthermore the opposite of the suggested strategy seem to exhibit the large downturns but miss the peaks that the suggested strategy exhibit.

This strategy seems to be a worthwhile investment and a less risky investment than being in the market during the whole year.

Figure 5: Comparison between investment strategies.

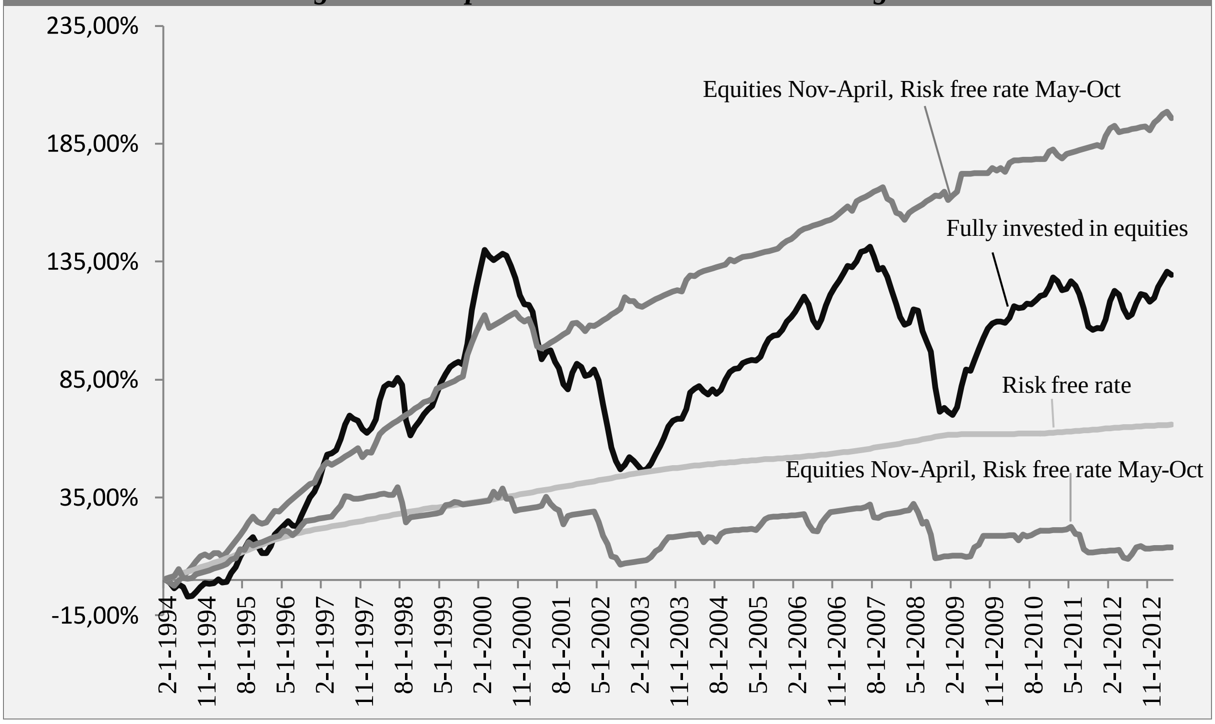

Figure 4: Comparison between investment strategies.

6. ANALYSIS

Our analysis chapter will start with short discussion and analyses of the results from statistical tests for the general market. The emphasis will be on analyzing the sectors as our research is focused on Halloween effect from a sector perspective. The rest of the chapter will be cover discussion related to our research question. We will summarize our findings in empirical chapter then connect the results to previous research and other parts of our theoretical framework.

In Empirical section 5.2 evidence was presented that indicate the existence of the Halloween effect in Sweden. The results show that the Halloween effect is significant for both the period 1969-2012 and 1998-2012 with p value < 0,01 even when an additionally dummy variable for the January month is included. The result is similar to the result that Bouman and Jacobsen (2002) got in their research which showed that the Halloween effect was significant at 1% level (p value less than 1%). The strategy presented in our last empirical section indicate that Halloween effect have practical relevance to consider. The strategy provide higher returns without increasing the risk, this is in line with the results that Bouman and Jacobsen (2002) as well as the results proved by Jones and Lundstrum (2009).

Our result are clear and indicate there is in fact a Halloween effect in Swedish market our research is however concentrated on how the Halloween effect is manifested, whether it's concentrated to certain sectors or if it's a market wide anomaly. We will now look over the Halloween effect in our different sectors to see which sectors show higher degree of the Halloween effect as well as further analyze our results whether there exists a pattern similar to the research of Jacobsen and Visaltanachoti (2009) in which they found differences between sectors; production sectors tend to perform better during winter months while consumer sectors perform better during summer.

Our research question is:

Is the Halloween effect isolated to specific sectors or present market wide?

In order to answer this question we attached three hypotheses:

2.1 Is the Halloween effect statistically significant in the respective sector?
2.2 Is the Halloween effect statistically significant when the January effect is included?
2.3 Is the Halloween effect statistically significant against market returns?

The results of our test hypotheses can be seen below:

Table 18: Hypothesis summary for the Halloween effect in Sectors

	Significance (acceptance or rejection of null hypothesis)		
Sector	***Hypothesis 2.1***	***Hypothesis 2.2***	***Hypothesis 2.3***
Industrials	**0,011 (Rejected)**	**0,022 (Rejected)**	0,129 (Accepted)
Forestry & Paper	0,461 (Accepted)	0,181 (Accepted)	0,534 (Accepted)
Financials	**0,037 (Rejected)**	0,179 (Accepted)	0,992 (Accepted)
Consumer services	0,139 (Accepted)	0,216 (Accepted)	0,745 (Accepted)
Consumer goods	**0,01 (Rejected)**	0,116 (Accepted)	0,745 (Accepted)
Construction & material	**0,053 (Rejected)**	0,203 (Accepted)	0,686 (Accepted)
Basic material	**0,051 (Rejected)**	**0,003 (Rejected)**	**0,018 (Rejected)**
Technology	0,34 (Accepted)	0,613 (Accepted)	0,129 (Accepted)
Healthcare	0,419 (Accepted)	0,179 (Accepted)	0,534 (Accepted)

The conclusions we could draw from the results of our hypotheses is that the Halloween effect is more concentrated to a few sectors than being market wide. When considering the results for *Hypothesis 2.2*, 5 sectors show a significant Halloween effect. Some of them highly significant; Consumer sector 1%, Industrial sector 1,1% and financials 3,7%. The results is however less convincing when the January dummy variable and market is included rendering almost all sector insignificant except Industrials and Basic material for hypothesis 2.2 and only Basic material sector for hypothesis 2.3.

As mentioned earlier, in previous research section the exclusion of the January effect into a separate dummy variable is likely to understate the Halloween effect and overstate the

January effect. From *Figure 3* one can see that January month is clearly performing best with an average monthly return on 0,87% followed by November month which had an average return of 0,063%. The Halloween effect could thus been reduced and turned insignificant for some sectors when excluding the January month in order to test the Halloween effect existence when January month is excluded. There are few sectors that show significance close to 10%, possibly Consumer goods could be considered having a Halloween effect. The annualized returns in *Figure 2* and *Table 11* show stronger support for the Halloween effect then our statistical tests which partly could thus partly be explained by the exclusion of the January month in Hypothesis 2.2.

Additional support for the Halloween effect being sector specific is the similarity in risk during winter and summer period but differences in return. As mentioned in the previous chapters the Halloween effect has been pointed out being caused by changes in investment behavior. Looking on *Figure 4* and *Table 15* the risk measured in standard deviation is more or less the same for the two different periods while the return is higher for the winter periods. This is illustrated with the Sharpe ratios for the different periods which are positive for all winter periods while being negative for the summer periods. This show support against the Halloween effect being a market wide caused by changes in investment behavior as there are no noticeable differences between the risk in the two different periods but in returns.

The next step is to further analyzing the characteristics of the Halloween effect in order see if we have similar results as previous research have found. Jacobsen and Visalatanachoti (2009) found a connection between the life span of products and the Halloween effect. Sectors that produced products with short life span such as consumer products, food and utilities tended to show little differences between return during winter and summer. The opposite is true for sectors producing products with large life span such as construction, industrial products, automobiles etc.

The initial results of the annualized returns in Table 11 and figure 4 showed a Halloween effect for all Industrial sectors i.e. the winter returns are higher for all sectors. The risk free rate is lower during summer periods than all sectors summer returns. Only two sectors show positive summer returns; Consumer Service- and Healthcare sector which had average return of 0,75% and 0,57% respectively. When analyzing the months of best performance one can see in *table 12* and *13* that consumer sectors are not following the pattern of the other sectors. Healthcare sector have highest returns during May and Consumer service sector have second highest returns in July. This can be compared to Industrial sector which had the worst return in July, Basic materials have the worst returns in June and August. In section 3.2 we presented some definitions and previous research on business cycles and seasonal factors. The explanation of poor performance for production sectors in summer months due to the employee vacations seems like a reasonable explanation. We find this connection interesting and hope other researchers could further test this. The sectors that show the most significant Halloween effect is Industrial sector and Basic material sector, Industrial sectors is significant under hypotheses 2.1-2.2 and Basic material is significant in all hypotheses. The annualized returns for Industrial is for the winter period 2,71% and in the summer -0,69%, The return for Basic material was 1,83% in winter period and -1,06% in summer period. When comparing these two sectors with the previous it's appealing to make the connection that Jacobsen and Visaltanachoti (2009) found could be right; differences between production and consumer oriented sectors. Another sector that fit into the production sector idea is the construction material sector which also show significant Halloween effect in hypothesis 2.1, the average return for winter period is 2,13% compared to -0,56% in summer. Table 6 shows the sectors that exhibited large differences between winter and summer periods in Jacobsen and

Visaltanchoti (2009) research. The sectors that exhibited large differences in winter and summer returns are similar to the results in our research. The two sectors that showed the highest degree of Halloween effect are:

Basic material	*(Chemicals, Forestry and Paper, Industrial metal, Mining)*
Industrial sector	*(Electronic and Electrical Equipment, Industrial Engineering, Industrial transportation, Support services, Construction and materials)*

This can be compared to the sectors that Jacobsen and Visaltanchoti (2009) found large Halloween effect in; *Chemicals, Consumer durables, Construction, Clothes, Fabricated products, Mines, Machines, Steel, Transportation*

Our sample sectors are not optimal for comparisons but for the majority of sectors we can see connection to our data, in the sectors; Mines, Construction, Transportation and Steel are part of our two best performing sectors. Furthermore in Jacobsen and Visaltanachoti (2009) research the Chemical sector had also large differences between returns of the two periods Winter return: 8,10% and Summer return: 2,27%.

When it comes to consumer sector we find however not as strong similarities in the results. Consumer service sector and Healthcare sector show good performance during summer periods but the sector consumer goods sector however provide results that contradict this idea by having negative summer returns and a significant Halloween effect for hypothesis 2.1. Our data thus show similarities to the results of Jacobsen and Visaltanachoti in regard to production sector outperformance and but are not showing the strong performance of consumer sectors during summer periods. This connection becomes even weaker when considering the intercept for the hypotheses in our empirical section, the intercept for the consumer services, consumer goods and healthcare sector are far from significant and in mostly negative. The average returns for these consumer oriented sectors during summer periods are thus not significantly different from zero.

These inconclusive results regarding consumer oriented sectors leaves us still unable to ultimately support the idea posed by Jacobsen and Visaltanachoti (2009). We however consider that there seem to be truth to the idea as our production sectors are showing significant support. Further research with larger sample of sectors than we were able to acquire could provide a more definite answer. From the support of our research question we can however answer our research question by concluding that the Halloween effect is more likely to be sector specific than market wide in Swedish sectors. We hope that other researchers will answer this question for other markets which would bring the research community closer to pinpointing the underlying causes of the Halloween effect.

7. CONCLUSIONS AND FURTHER RESEARCH

The last chapter of our research will highlight the most important findings of our study. Lastly we will present suggestion for further research that we did not have time to include in our research.

7.1 Conclusions

Our empirical testing and the analyses of the results have led to several findings. The General market show in accordance to previous studies a significant Halloween effect for both of the periods 1998-2012 and 1969-2012. Additionally, the Halloween effect is significant even when January month are excluded and are thus not influenced by the January effect. Strategies that take advantage of the Halloween effect are shown to perform well when compared against a buy and hold portfolio.

The Halloween effect in Swedish sectors is isolated in few sectors, Basic material and industrial sectors show the most significant Halloween effect. The Basic material sector is the only sector that shows a significant Halloween effect when compared against market returns. The risk measured in standard deviation for the different sectors are shown to be constant throughout the year. This indicates that there should be more to Halloween effect then only changes in investment behavior.

The results for the different sectors are similar to finding of Jacobsen and Visaltanachoti (2009). Our production sectors; Basic material and Industrial sectors show a strong Halloween effect in similarity to the corresponding sectors that Jacobsen and Visaltanchoti (2009) researched. The consumer oriented sectors in our sample are however not showing a strong performance during summer period as they did in their study. We can't fully support findings of Jacobsen and Visantanachoti (2009) but our results show that Jacobsen and Visaltanachoti (2009) seem to the right track on finding underlying factors to the cause of the Halloween effect.

7.2 Further research

In the previous chapter we mention that we regard it interesting to further research the connection between the Halloween effect and Business cycles & Seasonality. The connection between the poor performance of industrial and basic material sector during summer periods and vacation period could thus be a part in a further research. The performance of sectors could be compared to Business and Seasonal cycles to further pinpoint why there exist vast differences between the periods which sectors outperform.

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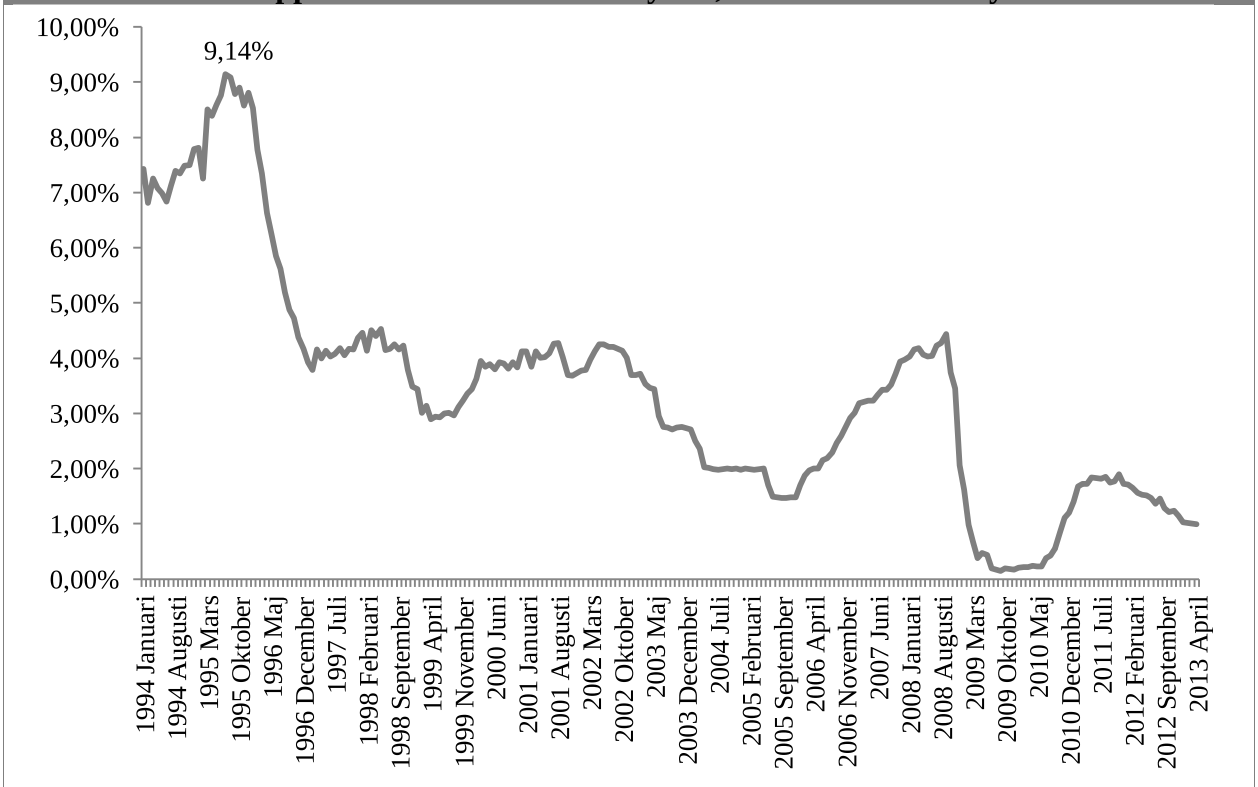
Thomson Datastream, Umeå University

9. APPENDIX

In our Appendix we will present tables and figures that are used in our research but not included in our empirical section.

Appendix 1: Swedish treasury bill, one month maturity



Appendix 1: Figure showing the risk free rate for a one month Swedish Treasury bill in yearly rates. Data have been retrieved from Thomson data stream.

Appendix 2: All FTSE Sectors available through Thomson Datastream	
1	**FTSE SWEDEN FINANCIALS**
2	**FTSE SWEDEN TECHNOLOGY**
3	FTSE SWEDEN TELECOM
4	**FTSE SWEDEN BASIC MATS**
5	**FTSE SWEDEN CONSUMER GOODS**
6	**FTSE SWEDEN CONSUMER SERVICES**
7	FTSE W SWEDEN MEDIA L
8	FTSE W SWEDEN LIFE INSURANCE
9	**FTSE SWEDEN CON & MAT**
10	FTSE SWEDEN FIXED LINE TELECOMMUNICATION
11	FTSE SWEDEN GENERAL RETAILERS
12	FTSE SWEDEN INDUSTRIAL MET

13	FTSE W SWEDEN DIVS. GENERAL IN
14	FTSE W SWEDEN LEISURE GOODS
15	FTSE W SWEDEN HEALTHCARE EQUIPMENT AND SERVICES
16	**FTSE SWEDEN INDUSTRIALS**
17	**FTSE W SWEDEN HEALTH CARE**
18	FTSE SWEDEN BANKS
19	FTSE SWEDEN TCH H/W & EQ
20	FTSE SWEDEN TOBACCO
21	**FTSE SWEDEN FORESTRY & PAPER**
22	FTSE SWEDEN INDS ENG
23	FTSE SWEDEN SUPPORT SVS
24	FTSE W SWEDEN EQT IVST INS L
25	FTSE W SWEDEN ELECTRICITY L
26	FTSE SWEDEN MOBILE T/CM Y
27	FTSE W SWEDEN CHEMICALS L
28	FTSE SWEDEN FIN SVS L
29	FTSE W SWEDEN AUTO & PARTS L
30	FTSE W SWEDEN FD PRODUCERS L
31	FTSE W SWEDEN INDS TRANSPT L
32	FTSE W SWEDEN PHARM & BIO L
33	FTSE W SWEDEN UTILITIES L
34	FTSE W SWEDEN OIL & GAS L
35	FTSE W SWEDEN NONLIFE INSUR L
36	FTSE SWEDEN MINING
37	FTSE SWEDEN HOUSEHOLD GDS
38	FTSE SWEDEN PERSONAL GOODS
39	FTSE W SWEDEN ELTRO/ELEC EQ L
40	FTSE W SWEDEN OIL & GAS PROD L
41	FTSE W SWEDEN REAL EST 'DEAD'

Appendix 2: All FTSE Sector indices available through Thomson data stream. Our chosen sectors have been highlighted in Bold.

Appendix 3. Breusch-Pagan Test for Research question 1			
Hypothesis 1.1			
Time period	**Degrees of freedom**	**Chi square value**	
1998-2012	179	0,075	Homoscedastic
1969-2012	519	0,031	Homoscedastic
Hypothesis 1.2			
1998-2012	179	0,251	Homoscedastic
1969-2012	519	0,023	Homoscedastic

Appendix 3: Results for hypothesis 1.1 and 1.2. The 1% critical values with 179 and 519 degrees of freedom are 225.933, 576.493 (MedCalc, 2013) the results show thus support for homoscedacity.

Appendix 4. Breusch-Pagan Test for Hypothesis 2.1		
Sectors	**Chi square value**	
Industrials	1,430	Homoscedastic
Forestry & Paper	0,861	Homoscedastic
Financials	0,185	Homoscedastic
Consumer services	0,915	Homoscedastic
Consumer goods	0,156	Homoscedastic
Construction & material	3,098	Homoscedastic
Basic material	0,259	Homoscedastic
Technology	0,679	Homoscedastic
Healthcare	0,265	Homoscedastic

Appendix 4: Results for hypothesis 2.1. The 1% critical values with 230 degrees of freedom are 282.814(MedCalc, 2013) the results show thus support for homoscedacity.

Appendix 5. Breusch-Pagan Test for Hypothesis 2.2		
Sectors	**Chi square value**	
Industrials	4,222	Homoscedastic
Forestry & Paper	0,804	Homoscedastic
Financials	0,764	Homoscedastic
Consumer services	3,354	Homoscedastic
Consumer goods	4,572	Homoscedastic
Construction & material	2,417	Homoscedastic
Basic material	1,001	Homoscedastic
Technology	0,816	Homoscedastic
Healthcare	0,224	Homoscedastic

Appendix 5: Results for hypothesis 2.2. The 1% critical values with 230 degrees of freedom are 282.814(MedCalc, 2013) the results show thus support for homoscedacity.

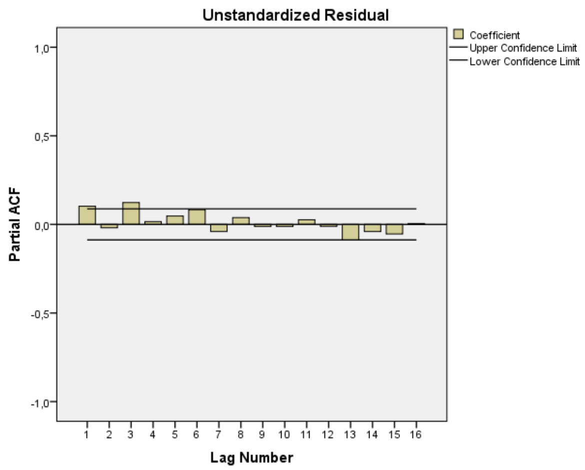
Appendix 6. Breusch-Pagan Test for Hypothesis 2.3

Sectors	Chi square value	
Industrials	8,547	Homoscedastic
Forestry & Paper	8,778	Homoscedastic
Financials	4,389	Homoscedastic
Consumer services	6,699	Homoscedastic
Consumer goods	6,699	Homoscedastic
Construction & material	3,003	Homoscedastic
Basic material	8,085	Homoscedastic
Technology	1,617	Homoscedastic
Healthcare	0,231	Homoscedastic

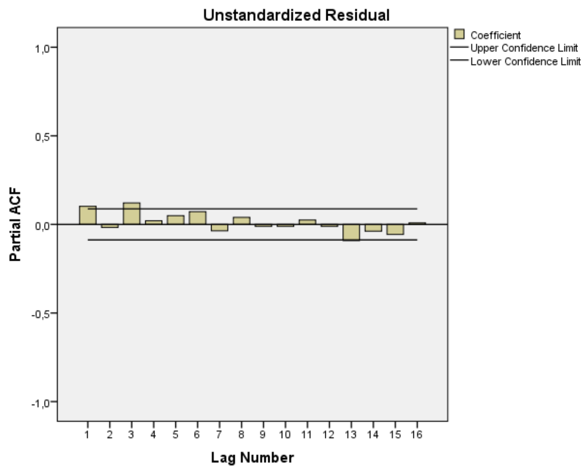
Appendix 6: Results for hypothesis 2.3. The 1% critical values with 230 degrees of freedom are 282.814(MedCalc, 2013) the results show thus support for homoscedacity.

Appendix 7: Autocorrelation for Hypothesis 1.1

1969-2012

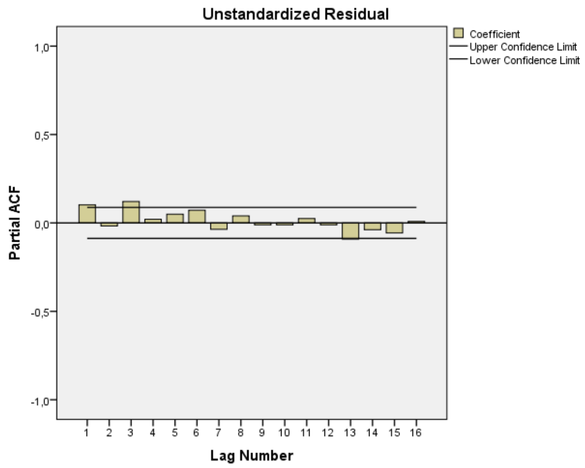


1998-2012

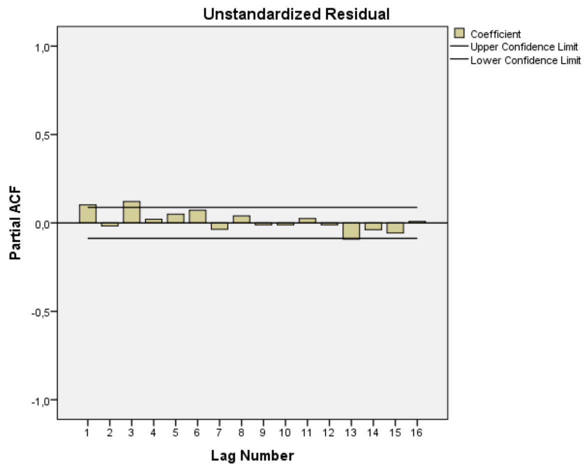


Appendix 8: Autocorrelation for Hypothesis 1.2

1969-2012

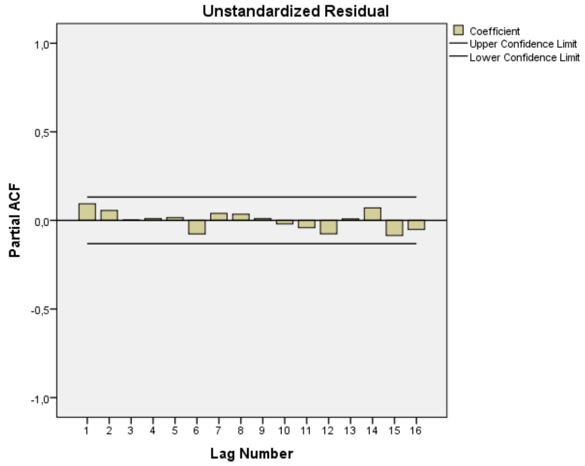


1998-2012

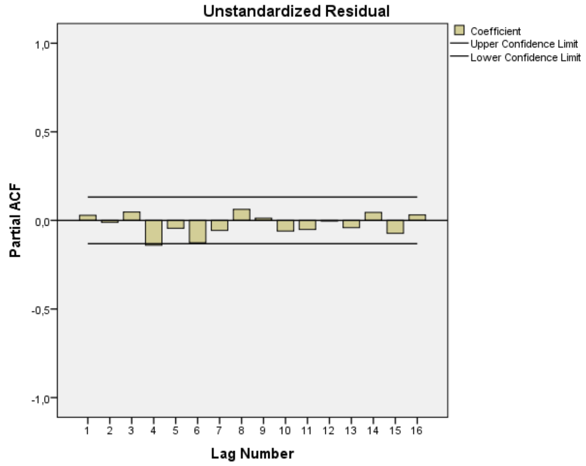


Appendix 9: Autocorrelation for Hypothesis 2.1

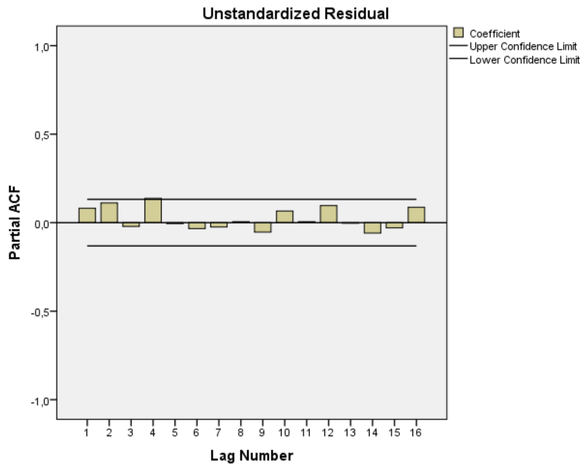
Industrials Sector



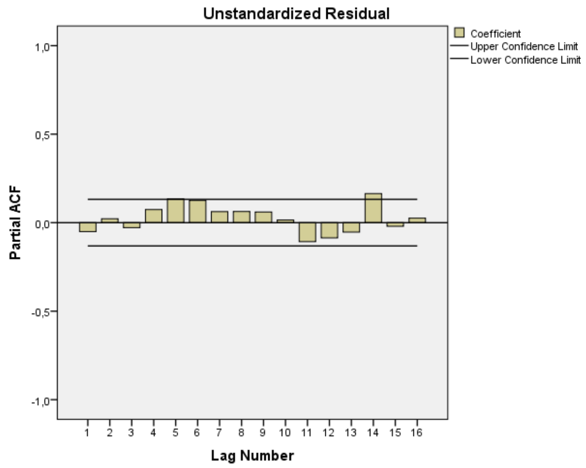
Forestry and paper Sector



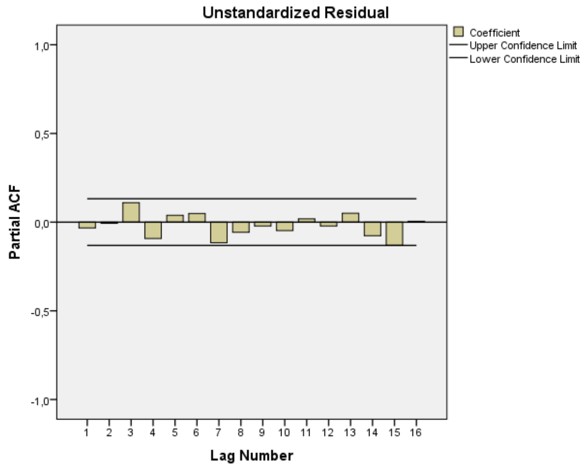
Financial Sector



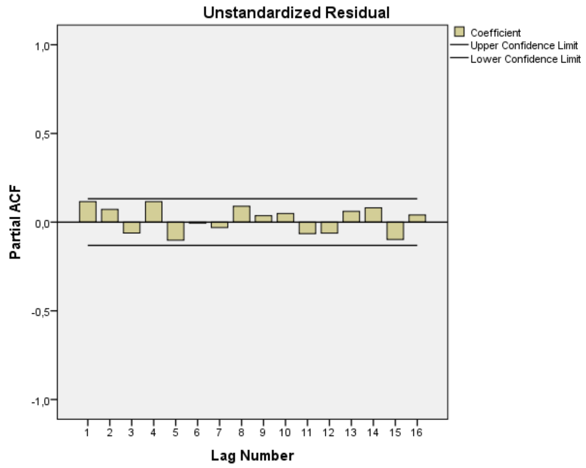
Consumer serivces Sector



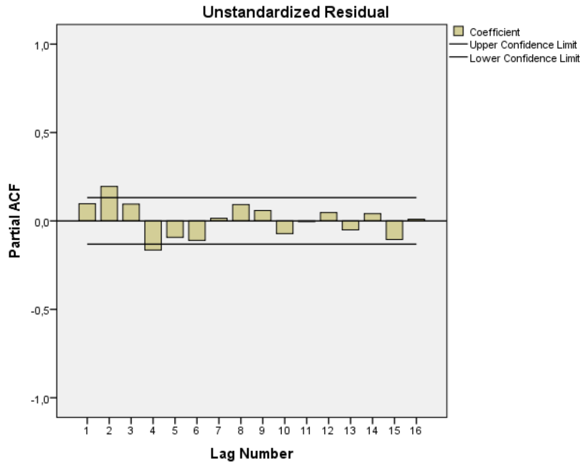
Consumer goods



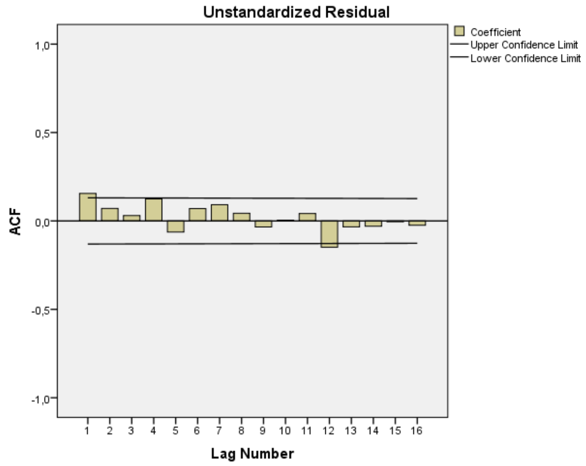
Construction material



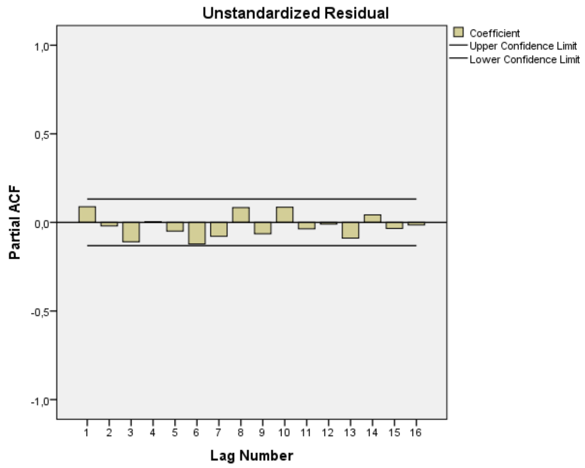
Basic material Sector



Technology Sector

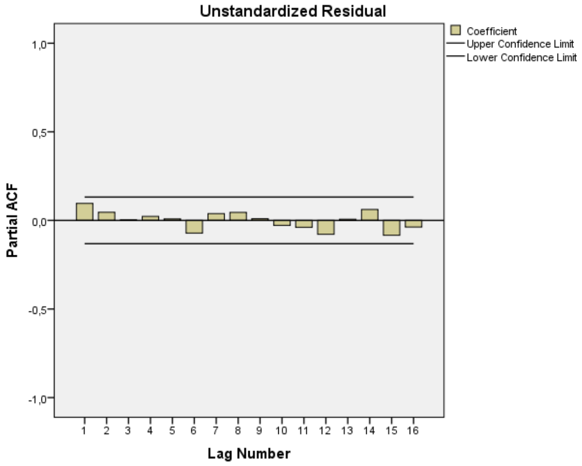


Healthcare Sector

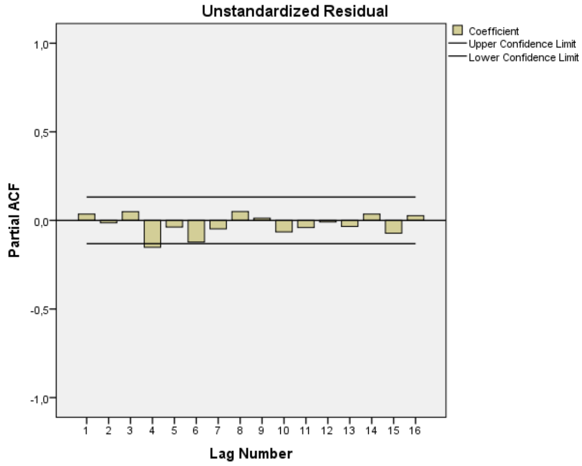


Appendix 10: Autocorrelation for Hypothesis 2.2

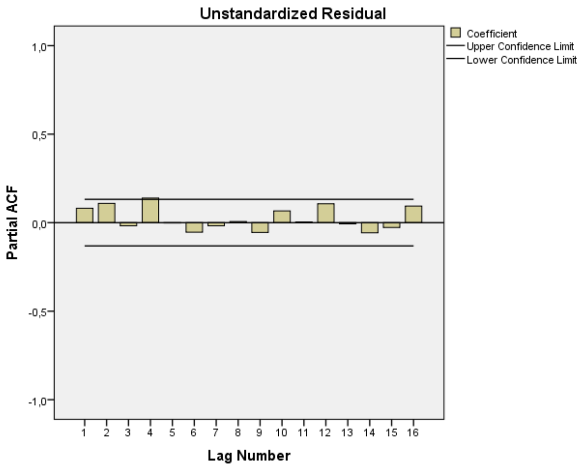
Industrials Sector



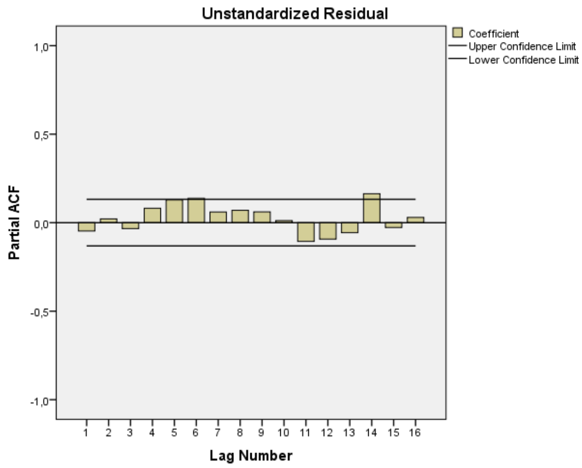
Forestry and paper Sector



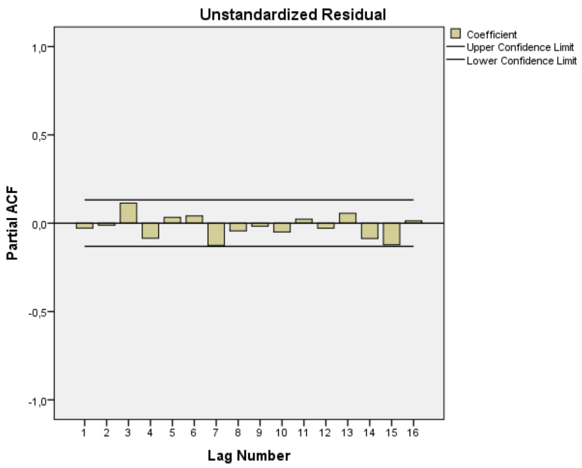
Financial Sector



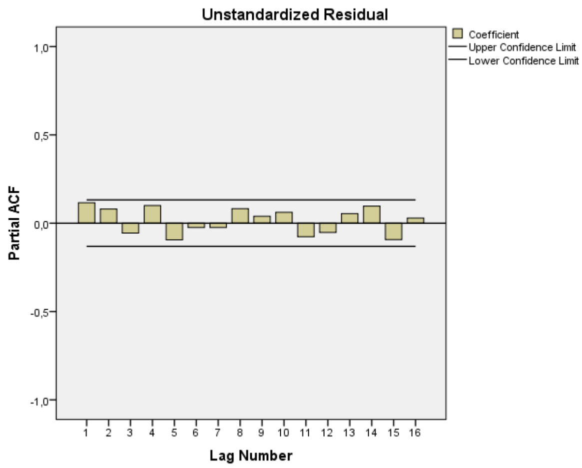
Consumer serivces Sector



Consumer goods Sector

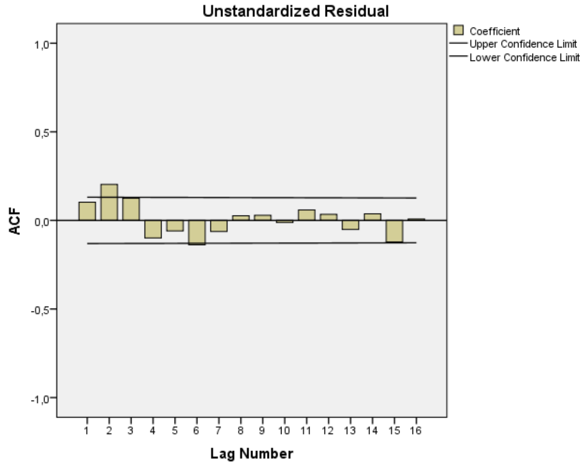


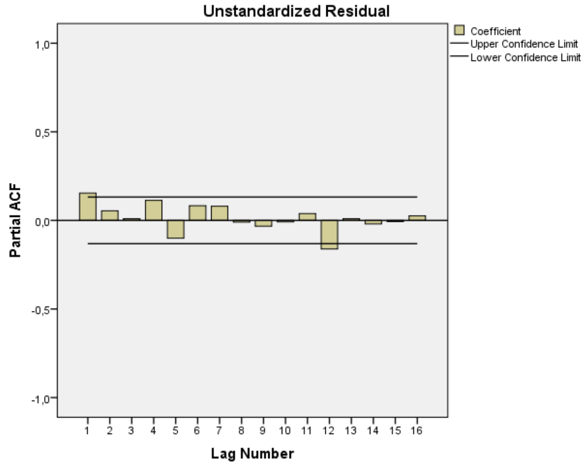
Construction material Sector



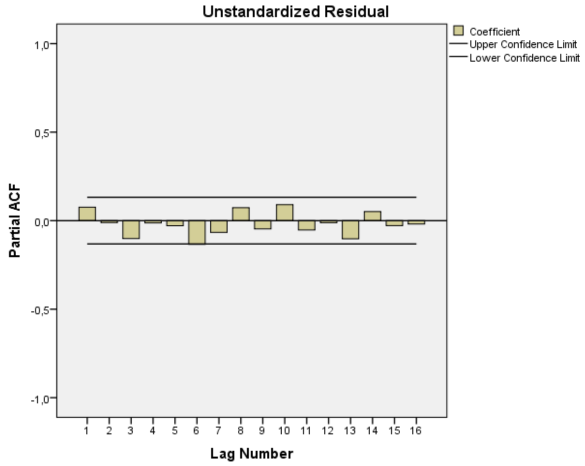
Basic material Sector

Technology Sector





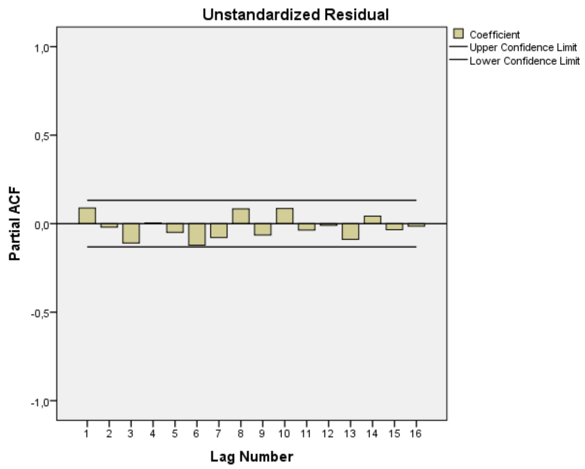
Healthcare Sector

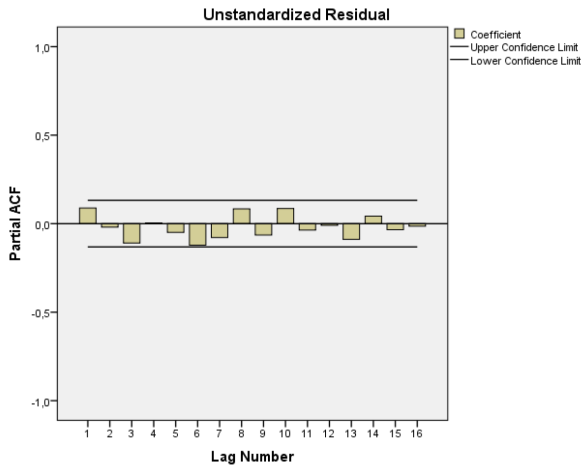


Appendix 11: Autocorrelation for Hypothesis 2.3

Industrials Sector

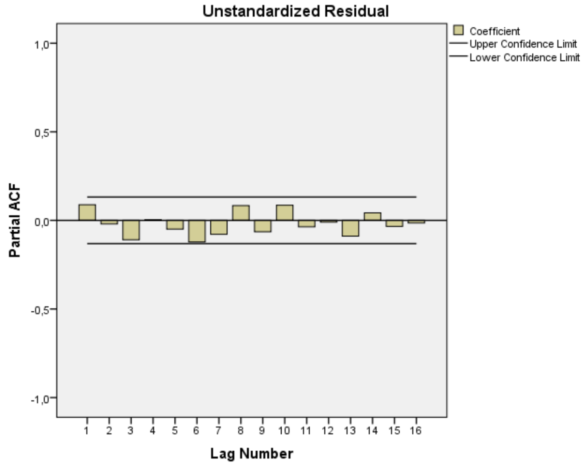
Forestry and paper Sector

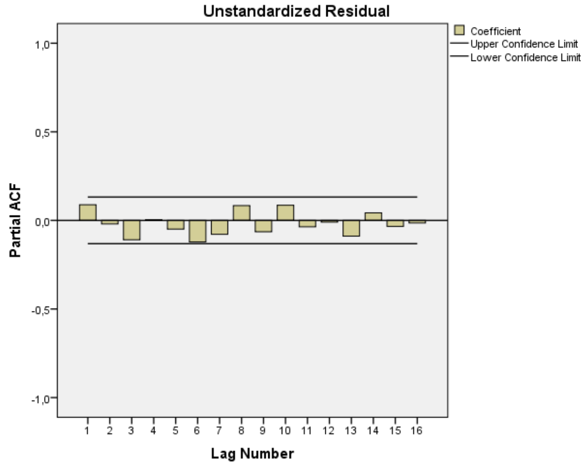




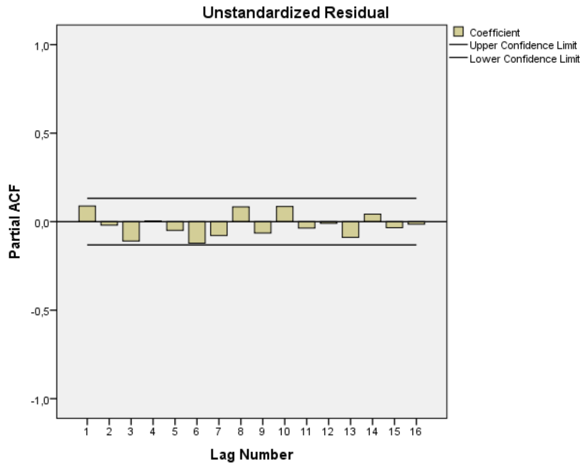
Financial Sector

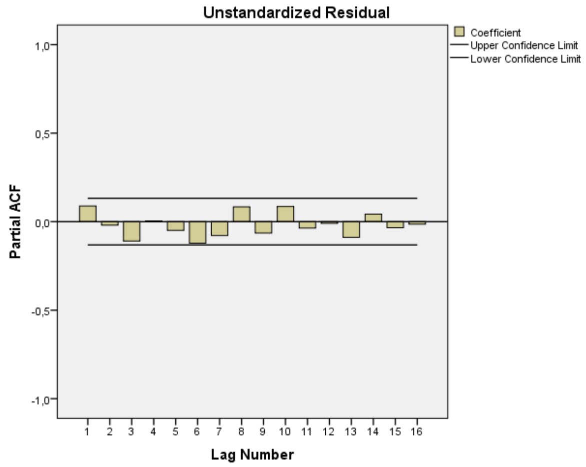
Consumer serivces Sector



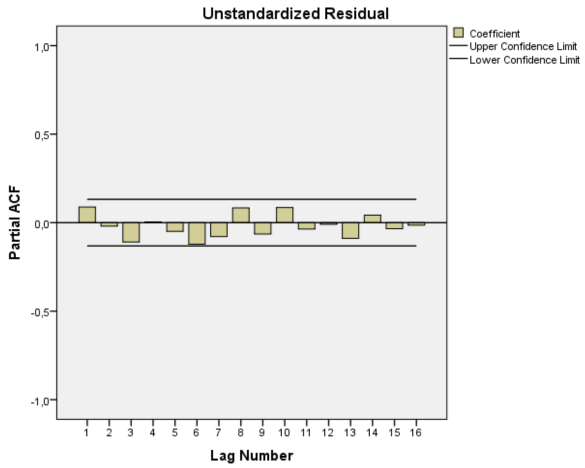


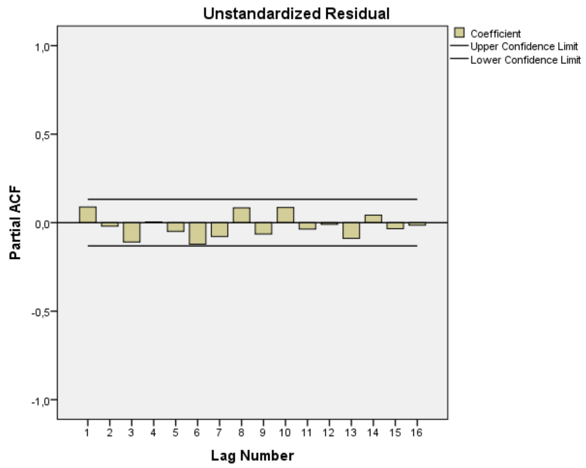
Consumer goods | **Construction material**



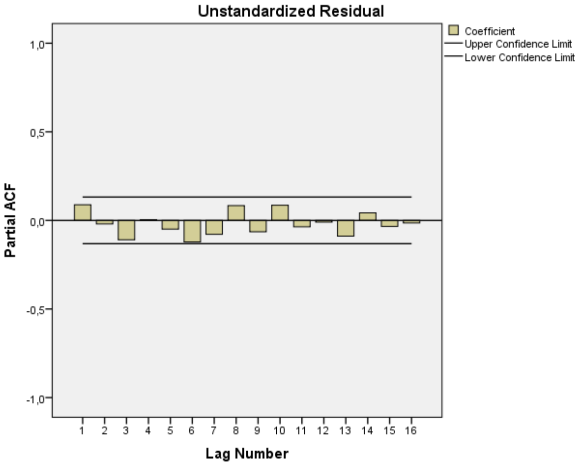


Basic material Sector | **Technology Sector**





Healthcare Sector


Unstandardized Residual
Coefficient
Upper Confidence Limit
Lower Confidence Limit
Partial ACF
1,0
0,5
0,0
-0,5
-1,0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Lag Number