



Seasonal Anomalies in the Swedish Stock Market from an Industry Perspective

Magnus Kroon

SAMMANFATTNING

Uppsatsens titel:	Seasonal Anomalies in the Swedish Stock Market from an Industry Perspective
Seminariedatum:	2008-06-05
Ämne/kurs:	NEKM01
Författare:	Magnus Kroon
Handledare:	Birger Nilsson
Nyckelord:	Aktiemarknad, effektiva marknadshypotesen, sommareffekt, regressionsanalys
Syfte:	Syftet med uppsatsen är att undersöka om och i vilken omfattning det existerar en sommareffekt på den svenska aktiemarknaden i allmänhet och i specifika industriindex i synnerhet.
Metod:	Genom en kvantitativ angreppsmetod samlas dagsnoteringar för AFGX och fem stora industriindex in och ordnas i kvartal. Dessa kvartal undersöks sedan med t-test samt regressionsanalys för att utröna förekomst av säsongsanomalier.
Teoretiskt perspektiv:	Den effektiva marknadshypotesen som presenterad av Fama utgör fundamentet i uppsatsen. Nödvändiga statistiska teorier och metoder presenteras där så krävs.
Empiri:	En multipel regressionsanalys med dummyvariabler samt t-test utnyttjas för att klarlägga om statistiskt signifikanta skillnader mellan sommarkvartal och övriga kvartal existerar. Tidsramen är från 1996-01-01 till 2007-12-31.
Slutsatser:	Denna magisteruppsats avsåg att undersöka förekomsten av säsongsanomalier korrelerade till sommarmånader på den svenska aktiemarknaden. Starkt stöd för denna hypotes har funnits och ligger i linje med tidigare forskning. Inga slutsatser till varför har dragits, men några förslag och dess implikationer presenteras.

ABSTRACT

- Title:** Seasonal Anomalies in the Swedish Stock Market from an Industry Perspective
- Seminar date:** 05/06/2008
- Course:** NEKM01
- Author:** Magnus Kroon
- Advisor:** Birger Nilsson
- Key words:** Stock market, efficient market hypothesis, summer-effect, regression analysis.
- Purpose:** The purpose of this master thesis is to examine whether or not a seasonal anomaly known as the summer effect exist in the Swedish stock market.
- Methodology:** Using a quantative approach, daily notifications of various indices have been transformed into monthly and quarterly returns. These have then been processed using simple t-test analysis and a regressional analysis using dummy variables.
- Theoretical perspectives:** Famas theory of the efficient market is used as a fundament in this thesis. Necessary theoretical concepts such as anomalies and statistical methods are presented where needed.
- Empirical foundation:** The multiple regression analysis and students t-test are used to determine if or if not there exist a significant summer anomaly. The test period is twelve years ranging from 01/01/1996 to 12/31/2007.
- Conclusions:** This master thesis set out to examine if and how the Swedish stock market display a seasonal anomaly correlated to the summer months. Strong support for this hypothesis is found and is in line with previous studies. No conclusive reasons for this phenomenon are found but some suggestions and their implications are presented.

Seasonal Anomalies in the Swedish Stock Market from an Industry Perspective

MAGNUS KROON

Department of Economics, Lund University, Lund 220 07, Sweden

E-mail: kroon_m@hotmail.com

Received: 2008

Summary: To satisfy this growing need of financial expertise, media through TV, radio, morning and evening newspapers and trade press is literally flooded with information about the market and strategies on how to invest ones capital, and how to achieve excess returns. Moreover, the increased number of investors, both private and institutional, has led to an abundance of ideas how to outperform the markets. This master thesis examines whether or nor there are signs of an anomaly during the summer months exploitable by investors. This *summer-effect* is found and the reasons for its existence are discussed. No conclusive answer is presented, but some evidence points towards the connections between lower turn-over and lower returns.

Keywords: Stock market, efficient market hypothesis, summer-effect, regression analysis.

1. INTRODUCTION

Over the last couple of decades there has been a steadily growing interest in new and different forms of investment in the general Swedish public. Stocks, bonds and other forms of equity have become common commodities for the typical private investor. A market previously reserved for the rich and affluent has become the interest of the masses. According to one survey over 2.2 million Swedes own stocks¹, this I however 15% less

¹ <http://www.dn.se/DNet/jsp/polopoly.jsp?d=3130&a=733671> [Accessed 28/04/2008]

than the peak in 2002. The trend is none the less obvious, stocks as form of investment for the general public is here to stay. This development brings in its wake not just an interest in the personal portfolio, but also an interest for the mechanisms and theories behind it all. To satisfy this growing need of financial expertise, media through TV, radio, morning and evening newspapers and trade press is literally flooded with information about the market and strategies on how to invest ones capital, and how to achieve excess returns. Moreover, the increased number of investors, both private and institutional, has led to an abundance of ideas how to outperform the markets. In asset pricing models where heterogeneous beliefs is a fundamental condition, this great divergence amongst investors in combination with the possibility of short sales leads to higher turnover and higher returns (Harrison and Kreps, 1986; Harris and Raviv, 1993; Scheinkman and Xiong, 2003).

A great deal of studies in both Sweden and abroad in the financial markets has been conducted in order to find any anomalies that could be said to have seasonality. Weekday, January and monthly effects, i.e. patterns with unusually high or low returns that could be exploited by investors. These studies have primarily been carried out in the stock and fund markets. The results have been varied but mostly they tend to acknowledge seasonal anomalies.

The first in a long row of researchers who examined seasonal effects in the stock exchange was Wachtel (1942). He looked at the Dow Jones index from 1927 to 1942 and his findings concluded bull tendencies in January for eleven of the 15 years. His conclusion to the observed phenomena was that investors realized capital losses in December in order to settle profits during the previous year and thereby make use of tax benefits. Another hypothesis argued by Reinganum (1983) is that 'returns in January are significantly positive for those stocks with negative returns during the previous year or towards the end of the year' (Mehdian & Perry, 2002). The hypothesis stipulates that investors, in order to re-establish their portfolios, buy stocks in early January and this creates an unnatural buying pressure driving stock prices up. Rozeff and Kinney (1976) and Haugen & Jorion (1996) continued Wachtels research through further empirical studies of the American stock exchange. Since then many researchers have examined various kinds of seasonal anomalies. Both Guletkin & Guletkin (1983) and Ogden (1990) studied the January effect. Most notably, the January effect has been found to have a larger impact on small firms than larger ones and to occur early in the month (Roll, 1977;

Banz, 1981; Keim, 1983, Chan, 1986). Ritter (1988), confirmed earlier studies but opted to explain it through the 'parking-the-proceeds hypothesis'. Generally the tax-loss selling hypothesis is considered true, some studies (Jones, Pearce & Wilson, 1987; Pettengil, 1986) have put forth reservations and points out that this effect existed even before income taxes were imposed in the United States. Internationally, the January anomaly has been found in countries with a different set of tax laws (Corhay, Hawawini & Michel, 1987).

In some cases there has also been confirmation of a July effect as with Al-Saad & Moosa (2005). This effect implies a higher return in July as opposed to January. A wide variety of studies have been conducted with regard to the week day effect (Gibbons & Hess, 1981) and weekend effects (Lakonishok & Smidt, 1988). The general conclusions of these studies are that there is a significantly higher return on Fridays, while Mondays display significantly lower returns. Several international studies that examined stock and fund markets outside of continental America (Jaffe & Westerfield, 1985) have confirmed seasonality in the United Kingdom, Japan, Canada and Australia. Similar studies have taken place in Sweden with the Swedish stock exchange. Amongst others we find Claesson (1987), Frennberg & Hansson (1992), Dahlquist & Sellin (1996) and Graah-Hagelbäck & Kroon (2005). The studies performed in Sweden clearly verify the findings internationally through the confirmations of both the January effect and the July effect. Worth noting is that the mostly unknown and unexamined summer effect has been found in the Stockholm stock exchange (Graah-Hagelbäck & Kroon, 2005).

Further studies on seasonality include the weekend or the day-of-the-week effect (Fama, 1965; Cross, 1973; French, 1980), intra-daily effect (Harris, 1986; Smirlock and Starks, 1986), intra-monthly effect (Ariel, 1987), and inter-quarterly effect (Penman, 1987). All these studies that have been trying to explain the various seasonal patterns have not yet been able to provide a complete and satisfactory explanation. Keim (1989), noted this already 20 years ago:

“Although we do not yet have an explanation of the weekend effect, we do know that the effect is not likely to be a result of measurement error in recorded prices (Gibbons and Hess, 1981; Keim and Stambaugh, 1984; Smirlock and Starks, 1984), the delay between trading and settlement due to check clearing (Gibbons and Hess,

1981; Lakonishok and Levi, 1982) or specialist trading activity (Keim and Stambaugh, 1984).”

A fourth possible explanation was thoroughly rebutted by Peterson (1990), after having followed Penman’s (1987) argument. Penman proposed seasonality in stock returns due to seasonality in earnings information, but Peterson concluded that this was highly doubtful after having examined all New York and American Stock Exchange firms over a period of six years.

What all the studies mentioned above share is that they in different ways test the effective market hypothesis put forth by Fama (1970). In essence it posits that an effective market is defined by being a market where the stock price is efficiently priced and always fully reflects all available information concerning the intrinsic value of the underlying security. The theory leads to the conclusion that profit seeking investors eliminates all unexploited profit opportunities. The empirical studies mentioned above all tend to imply that market imperfections do exist and that the seasonal patterns and anomalies could be used to generate profit. These findings are in stark contradiction to the efficient market hypothesis and challenge it to various degrees. According to Fama, the prices on the market follow a ‘fair-game’ model, i.e. the real return of the stock and the return that the market expects should be equal with respect to the available information.

Of all the studies conducted, the seasonal effect in general and the summer effect in particular have not been extensively examined in the Swedish stock exchange. Researchers have mainly focused on weekday, month and weekend effects. The only study that specifically examines the summer effect is the one made by Graah-Hagelbäck & Kroon (2005). This paper aims to deepen that study by introducing more industries in which to look for seasonal anomalies. The question if the market is effective or not is still a subject often debated and even if there has been a great number of studies published regarding the existence of seasonal effects the experts have not yet agreed when, why or even how they occur. All of this makes the subject interesting and a pressing issue of current interest. The scientific basis and major source of inspiration for this study is the work-in progress paper by Hong and Yu (current draft; October 2007), *Gone Fishin’: Seasonality in Trading Activity and Asset Prices*. Hong and Yu are in their paper trying to examine and describe the intricate relationship between trading volume and stock return, using the summer vacation months as a source of exogenous variation.

The delimitations of the paper will be the Swedish stock exchange and a selection of five industries as promoted by Affärsvärlden. The Swedish market is chosen since it is the most interesting one from a Swedish perspective. Furthermore, a follow up and expansion of Graah-Hagelbäck & Kroon (2005) would increase the knowledge about the elusive summer effect. The nine industries will be directly translated from Swedish to English and are as follows: Finance, Healthcare, Industrials, IT and Services. In addition to these industries the AFGX (the general index of Affärsvärlden) will also be included to make the comparison more informative. The choice of these industries is two fold. Firstly, the reason for a comparison between the industries is self evident. Secondly, available data for the chosen period 1996 to 2007 is very good for said industries. The time period is chosen as a result from the empirical findings of Graah-Hagelbäck & Kroon (2005). That paper concluded that a summer effect is evident from 1990-2004, but not for the reference period of 1950 to 1989. It would be very interesting to see how, and if, this development has continued. External factors such as political events and interest rate changes will not be included since this would lead to a too extensive study.

This article has been organized as follows. In section 2 the theory behind the study is discussed. The discussion will however be fairly brief with respect to the expected readers' knowledge in the subject. This is an article, not a textbook in Financial Economics. In section 3 the methodology of the empirical testing will be explained. The results of the empirical data are then presented in section 4, these will then be analysed and concluded in section 5. References and empirical data (in the form of appendices) are to be found in the back of the paper.

2. THEORY

An anomaly, or market anomaly, is a form of inefficiency that often is being referred to as a price and/or return distortion within the financial markets. Generally, market anomalies are thought to be related to structural factors such as unfair competition or lack of market transparency, or, in some cases, to behavioural biases by various economic agents. The latter is often included in the field of behavioural finance. To exemplify the anomalies mentioned in the introduction, a short run-through of the different anomalies will follow.

First of all we have the week effects, or turn-of-the-calendar effects. These anomalies represent a deviance in returns for some specific months of the year. Be it the last week of the month, or the first weeks of the year. The distinguishing feature of them being a differentiating return in stock return compared to other observed weeks. Both lower and higher returns are of course of great interest and self explanatory. Of the proposed explanations for positive returns at the turn of the month and at the turn of the year, Ogden's (1990) is one of the most compelling. Ogden, after studying the proceeds from the American stock market proposed the idea that the causes of these anomalies are a direct consequence of the standardized payment systems of corporations. According to the study the regularity of salary payments, at the turn of the month, and the subsequent concentration of cash flows infer an effect similar to the observed one. This chain of events inevitably leads to a minor boom in the stock exchange at the turn of the month in general and at the turn of the year in particular. Mostly because of bonus season, which more often than not occur in late December (Gray, 2007).

Lakonishok and Smidt (1988) established in their 90-year study that 57% of the years proved to have significantly higher yields during the first half of the month. The latter half of December, however, showed abnormally positive returns. Furthermore, the first part of April also had unusually high returns.

Another interesting anomaly is the so called week day effect where higher returns than normal occur in specific days of the week, often in a returning pattern over the year. Typically, the week day effect in the stock markets around the world come about on Fridays, with a high yield, and a relative decline on Mondays. When defining the different week day effect, this specific one is often referred to as the week-end effect. Lakonishok and Smidt (1988) examined the Dow Jones Index in the US and came to the conclusion that Mondays display a significantly lower return compared to the rest of the week, and that the last day of business every week a significantly higher one. To be able to satisfactorily explain this anomaly one has to take several aspects into consideration. One variable is the type and quantity of information available to investors; another is how and when investors respond to new information. One also has to remember is that private investors and institutional investors possess cash flow patterns of various kinds. These are in addition often seasonal.

One area of anomalies seldom (if at all) examined in the markets around the world is the proposed summer effect. Up until very recently, the widely held belief was that share turnover dropped significantly during the months of high vacation frequency. That meant August and September on Europe and North America. The anecdotal evidence turned out to be backed by some evidence as showed by Hong and Yu (2007). It would therefore be very interesting to see if the Swedish stock exchange in general and the larger industry sectors in particular display the same drop in return.

Ever since the notion of the effective market hypothesis became generally accepted in the 1950's, researchers have been trying to explain how and why the stock markets behave the way they do. It was not however until the 1960's that the hypothesis of efficient markets truly emerged as a prominent theoretic position. With numerous dissertations published concerning, and arguing for, the random walk theory (Cootner, 1964; Fama, 1965; Samuelson, 1965) it became evident that markets tend to organize themselves according to exogenous societal and political factors. The definition used here will be the one endorsed by Fama, and supported by his empirical findings. A clear majority of articles published, regarding seasonal anomalies in capital markets, use the effective market hypothesis as empirical foundation. Given that this paper also use the EMH, a brief run-through of its implications will follow.

Fama defined an efficient market as one in which prices for stocks, bonds, property etc. is fully reflected by available information, i.e. it asserts informational efficiency in the financial markets. The quintessence of this rationale is that prices, over all, reflect the collective beliefs of all the investors (Dimson and Mussavian, 1998). Subsequently it follows that no one person can consistently outperform the market, if only using information which is already available to the market as a whole. The theory disregards the possibility that abnormal and unexpected returns arise and that the market return follow a 'fair-game' model. The real return of the stock and the return that the market expects should be equal. It is said that only new information affects the stock price changes. Since future events and news cannot be predicted, the changes in stock price are equally likely to be positive as negative, i.e. a random walk. In the event that good news is published, the theory predicts a climb in price to a level which makes it impossible for investor to make further use of the rise. Fama further predicts that the three following conditions need

to be met in order for the price of the stock, bond or property (capital asset) to fully reflect the amount of obtainable information. The theory makes the proposition that a market is somewhere (i) where there are no transactions costs for securities and (ii) all available information is free and (iii) all involved parties are aware of the information and its potential significance for current prices and volatility vis-à-vis future prices. When and if all these conditions are met, the market is said to be efficient and the price of the securities hence represent all available information (Fama, 1970). However, since such friction free markets never exist, the conditions should not be considered absolute. There is still a possibility for the market to be efficient if a sufficient number of investors have access to the information.

There are in essence three different forms of market conditions according to Fama; weak form efficiency, semi-strong form efficiency and strong form efficiency, each with a new set of implications for how well the market performs. The literature in its terminology of efficiency separates operational efficiency and information efficiency. Operational efficiency stipulate that investor activity occur without delay and information efficiency deals with how fast and to what extent investors interpret new information (De Ridder, 2003). When the *weak-form efficiency* is present in the market, investors cannot create excess returns by implementing strategies of investment with historical share prices as a base. The weak-form also implies that only fundamental analysis may produce excess return, whereas technical analysis may not. This leads to the conclusion that current share prices are at best an unbiased estimate of the underlying security. The theoretical nature of the weak-form efficiency hence stipulates that identifying under or over valued stock is almost exclusively done by researching financial statements.

In the *semi-strong for efficiency* share prices are said to very rapidly (and unbiased) adjust to new public information. This leads to a state in where no excess returns can be made using or trading said information. Furthermore, in this state of the market neither fundamental analysis nor technical analysis can consistently be used to produce abnormal yields. This because all relevant information is fully reflected in stock, bond or property prices. In contrast to the weak form, the semi-strong form does not only include historical data, but also quarterly reports, dividends, interest rate changes and macro economic growth changes. In this case an investor cannot achieve excess returns since the price already include all relevant information. The inevitable consequence of Fama theory is

that there is no inefficiency in the market. This, one quickly notices, is repeatedly rebutted by studies of seasonal effects in the capital markets. To determine if semi-strong form efficiency is present event-studies are often performed, where the abnormal returns of stocks are identified. These abnormal returns can be defined as the difference between a stocks real return and its expected return. One way of calculating abnormal returns is by using the CAPM approach, as proposed by Haugen (2001).

In the *strong form efficiency* prices of stocks are thought to be fully reflected in given information, this includes insider information and such information that would otherwise be corporate secrets.

Even though many studies regarding seasonal anomalies have been conducted in the financial markets since they 1980's and in where the efficient market hypothesis justly have been questioned, criticized and repudiated, Fama sticks to his theory (Fama, 1998). Fama have put forth the theory that seasonal anomalies arise by sheer coincidence and are fragile in nature. All visible over and under reactions displayed by the investors in capital markets when new information becomes available arise equally frequently and thus, in the end evens out. This should according to Fama lead to that no anomalies occur. Additionally, the occurrence of anomalies can be deducted from the choice of statistical method, and most anomalies disappear when appropriate measures have been taken. True or not, many of the studies that contradict the efficient market hypothesis have been short term perspective ones. This may not be adequate since market efficiency only can be understood in the light of a long term perspective. More often than not, these studies lack an alternative theory suitable when compared to the efficient market hypothesis (Fama, 1998).

Furthermore, in most analyses it is important to determine whether or not the data material is normally distributed. The normal distribution is a probability model, shaped as a bell curve when it depicts the distribution of a variable in a population. The area between two end points along the x-axis and under the curve is said to be one, i.e. the distribution of a variable is limited by the area under the curve and between the two end points (Körner and Wahlgren, 2000). Before conducting a regression analysis the residuals will controlled to establish if they are indeed normally distributed by using the Jarque-Berra test through EViews. A histogram will display values of skewness and kurtosis. Skewness

is a measure the asymmetry of the probability distribution around zero. Perfectly asymmetrical residuals will assume the value zero. Kurtosis (from the Greek word *kyrtos*, i.e. bulging) displays the peakedness of the probability distribution and assumes the value three if normally distributed (Hill, Griffiths and Judge, 2001).

3. DATA AND METHODOLOGY

This study is based on statistical examinations and financial econometrics in order to establish whether or not the Swedish stock market display an anomaly that would be best described as a summer effect. If so, is it possible to lay down new evidence to repudiate or even disprove the efficient market hypothesis? The starting point of the survey and source of data has been the indices provided by Affärsvärlden and attained through Thomson Datastream Advance, the largest and one of the most respectable financial statistical databases available. The period chosen has been from 1996-01-01 to 2007-12-31, i.e. twelve years. The *modus operandi* of the paper has been the quantitative one as proposed by Jacobsen (2002). According to Jacobsen this method is recommended when the frequency or extent of a phenomenon needs to be established. Worth noting when conducting research as this is not to distance oneself too much from the object to be examined. This is especially true when dealing with numbers. Following Bryman and Burgess (2005) recommendations, efforts have been made to avoid empirical shallowness, which is a risk when performing statistical surveys. It is also a risk that the empirical findings of the research may seem more exact or even more plausible just because they are presented in numbers. Critique has been conveyed pointing out that the validity of the quantitative method may be questioned based on above assumptions.

The basis of the paper has been the testing of theoretical models with the intention of investigating if the anomalies found in the week days and turn-of-the-calendar points also can be found in the summer months. After establishing the use of theoretical models as a starting point a deductive approach has been chosen as this best suits an empirical survey where the aim is to confirm or refute a hypothesis (Jacobsen, 2002). Apparent risks when using the deductive approach for a quantitative method is that the information gathered might be selectively chosen, advertently or inadvertently. These risks are considered to have been avoided, for simplicities sake, through mere awareness of them. Since few, if

any, qualified research surveys have been made with the intention of investigating the summer effect in different industries in the Swedish stock market, the purpose of this paper becomes self evident, hence the descriptive nature of the included analysis. Overall, to avoid low or no validity and reliability, special consideration has been taken to the line of action proposed by Holme and Solvang (1997), Andersen (1998) and Dahmström (2005).

The choice of industries was made by first choosing the AFGX, Affärsvärldens Genaralindex (*The General Index of Affärsvärlden*), which is the oldest index in Sweden started in 1937. The AFGX is calculated by SIX (a Swedish supplier of financial information²) and updated every minute. The index is wealth weighted and measures the average stock price development in the Stockholm Stock Exchange³. The five industries will be directly translated from Swedish to English and are as follows: Finance, Healthcare, Industrials, IT and Services. The choice of these industries is two fold. Firstly, the reason for a comparison between the industries is self evident. Secondly, available data for the chosen period 1996 to 2007 is very good for said industries. The time period is chosen as a result from the empirical findings of Graah-Hagelbäck & Kroon (2005). In addition to the five industry indices the AFGX index will be added as a benchmark. The base day for all these indices was January 1, 1996 and their base value is 100.

The data material as provided through Thomson Datastream Advanced was split up into the five different indices plus the general index of Affärsvärlden (the AFGX), and presented as index values for each day. These were re-modelled into monthly observations and then their respective monthly return was calculated as follows:

$$r_i = \frac{P_i - P_{i-1}}{P_{i-1}}$$

² http://www.six.se/templates/pages/SectionStartPage___72.aspx, [Accessed 07/05/2008]

³ http://www.affarsvarlden.se/om_affarsvarlden/rundtur/article284389.ece?service=slideshow&imageId=1, [Accessed 07/05/2008]

The months were categorized into quarters with two different sub sets. In the first, called Summer 1, the summer is defined as June, July and August. The second, called Summer 2, with July, August and September acting as the summer quarter. Using EViews a

$$JB = \frac{n}{6} \left(S^2 + \frac{(K - 3)^2}{4} \right)$$

Jarque-Bera test will be performed to determine if the samples are normally distributed. The Jarque-Bera test is used in statistics as a goodness-of-fit test or measure from departure from normality. It is based on kurtosis and skewness of the sample and defined as:

n from above is number of observations, S is the skewness of the sample and K is the kurtosis; defined as:

$$S = \frac{\mu_3}{\sigma^3} = \frac{\mu_3}{(\sigma^2)^{3/2}} = \frac{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^3}{\left(\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2 \right)^{3/2}}$$

$$K = \frac{\mu_4}{\sigma^4} = \frac{\mu_4}{(\sigma^2)^2} = \frac{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^4}{\left(\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2 \right)^2}$$

The statistic Jarque-Bera test is asymptotically chi-square distributed with two degrees of freedom. The 5% critical value (χ^2 -distributio, 2 degrees of freedom) is 5.99, i.e. if the JB-statistic < 5.99 there will not be sufficient evidence from the residuals in the sample to conclude the assumption of normal distribution unreasonable (Bera and Jarque, 1980).

To be able to determine if significant differences in returns throughout the sample quarters, a statistical t-test will be performed. First, a confidence level is chosen, and in this paper the level is set at 95%. This is common practice unless there are strong grounds to suggest otherwise (Körner and Wahlgren, 2000). Second, a null hypothesis and a non-null hypothesis are constructed to be able to calculate a p-value (a probability measure) in order to decide whether or not to reject the null.

$$\mathbf{H_0: \mu = X}$$

$$\mathbf{H_1: \mu < X}$$

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$$

where,

t = p-value

Z = value from table

x= actual mean

μ_0 = observed mean

s = standard deviation

n = sample number

To report the outcome of the test, the p-value from above is used. The null hypothesis is rejected if when the absolute value of the t-statistic is greater than or equal to the predetermined critical value t_c that corresponds to the chosen level of significance (Hill, Griffiths and Judge, 2001), i.e. when $|t| \geq t_c$ the null is rejected. That is, when the expected value, μ , is significantly larger than the mean X . Another way of determining whether or not the summer months statistically differ from the rest of the quarters is to set up a multiple regression analysis. The multiple regression analysis takes into account more than one variable. The dependent variable y_t is being related to other descriptive variables ($x_{t2}, x_{t3}, \dots, x_{tK}$) through a linear equation. The parameters $\beta_2, \beta_3, \dots, \beta_K$ are unknown and the intercept parameter α is the value of the dependent variable when all other independent variables are zero. In most cases this parameter has no clear economic explanation but is included in the model since it can help providing an overall view. The other parameters in the model measure the change of the dependent variable when the descriptive variable change one unit (and the other variables remain constant, Hill, Griffiths and Judge, 2001). Every residual has a probability distribution with a mean of zero ($E[e_i] = 0$) when the number of observations is large, and every observation of the dependent variable y_t is bound to the residual e_t , hence y_t is also a random variable. According to Hill, Griffiths and Judge (2001), the multiple regression model is:

$$y_t = \alpha + \beta_1 + \beta_2 x_{t2} + \beta_3 x_{t3} + \dots + \beta_K x_{tK} + e_t \tag{1}$$

Furthermore, the assumptions of the model are:

$$\text{MR1. } y_t = \alpha + \beta_1 + \beta_2 x_{t2} + \beta_3 x_{t3} + \dots + \beta_K x_{tK} + e_t, t = 1, \dots, T$$

$$\text{MR2. } E(y_t) = \alpha + \beta_1 + \beta_2 x_{t2} + \beta_3 x_{t3} + \dots + \beta_K x_{tK} \leftrightarrow E(e_t) = 0$$

$$\text{MR3. } \text{var}(y_t) = \text{var}(e_t) = \sigma^2$$

$$\text{MR4. } \text{cov}(y_b, y_s) = \text{cov}(e_b, e_s) = 0$$

MR5. *The values of x_{tk} are not random and are not exact linear functions of the other explanatory variables*

$$\text{MR6. } y_t \sim N(\alpha + \beta_1 + \beta_2 x_{t2} + \beta_3 x_{t3} + \dots + \beta_K x_{tK}, \sigma^2) \leftrightarrow e_t \sim N(0, \sigma^2)$$

Two conclusions can be drawn from the above assumptions. Firstly, the explanatory variables are not random and secondly, any explanatory variable is not an exact linear equation of any other. The multiple regression analysis is used in this study since it is a statistical approach often recommended in economic literature. Many of the previous studies conducted have also used the approach with dummy variables and they have been shown to work.

According to Chen and Chan (1997) and Fama and French (1989) there are compelling evidence that both yield spreads and risk premiums vary with the general state of the economy. If that is the case it would also be interesting to examine if the seasonality of returns are driven by quarterly conditions such as vacations and summer holidays. Is the average quarterly mean robust across the four quarters? To shed more light on this matter the following model is applied to analyze the sample. It is a standard dummy variable regression analysis:

$$R_{jt} = \alpha_j + \beta_j \sum_{i=2}^4 D_{it} + u_{jt} \quad (2)$$

In the equation R_{jt} represent the return for the j th series at time t , D_{it} are quarterly dummies such that it value is one for quarter one and zero otherwise. u_{ij} are residuals and assumed to be normally distributed, i.e. 'exhibit standard statistical properties found in normal regression analysis' (Chen and Chan, 1997). The first step in the analysis is to

apply equation (2) to all index series for the sample using the classical OLS method. Some literature mentioned by Chen and Chan (1997) also suggest that when using a return generating process of stocks, the result would be better altogether if estimated using a basic heteroscedastic model (French, Schwert and Stambaugh, 1987). Tests are also made to see if autocorrelation or heteroscedasticity is present. The two tests are based on the following conditions:

$$u_{jt} = \phi u_{jt-1} + e_{jt}, \quad (3)$$

$$h_t^2 = a + bu_{jt-1}^2, \quad (4)$$

where $u_t | \Omega_{t-1} \sim (0, h_t^2)$. (5)

In the equations above, equation (3) tests the residuals for first order autocorrelation. Equation (4) test if the residuals follow a first order autoregressive conditional heteroscedasticity model (also known as ARCH-1, see Engle, 1982). The abovementioned procedure is thereafter applied to the whole sample, with the outset of testing whether the summer quarter returns are in any way statistically different from the rest of the quarters. Testing the differences between the summer quarter and the other three quarters of the year is to be considered justified based on prior findings (Graah-Hagelbäck and Kroon, 2005) that would indicate the presence of said effect and by support found in literature.

4. EMPIRICAL RESULTS

Before the calculations and analysis of the empirical findings were conducted some minor adjustments to the data set were performed. Primarily the possibility of extreme values in the data dispersion was examined. These outliers could have a negative impact on the reliability of the findings and were hence removed from the material and substituted by interpolated values. The method as such is one proposed by Körner and Wahlgren, 2000. The outliers, i.e. the observations numerically distant from the rest of the data, were defined such that those observations more than 1.5 quantiles from the first and the third quantile respectively (Hyndman and Fan, 1996).

Furthermore, in most analyses it is important to determine whether or not the data material is normally distributed. The normal distribution is a probability model, shaped as a bell curve when it depicts the distribution of a variable in a population. The area between two end points along the x-axis and under the curve is said to be one, i.e. the distribution of a variable is limited by the area under the curve and between the two end points (Körner and Wahlgren, 2000)

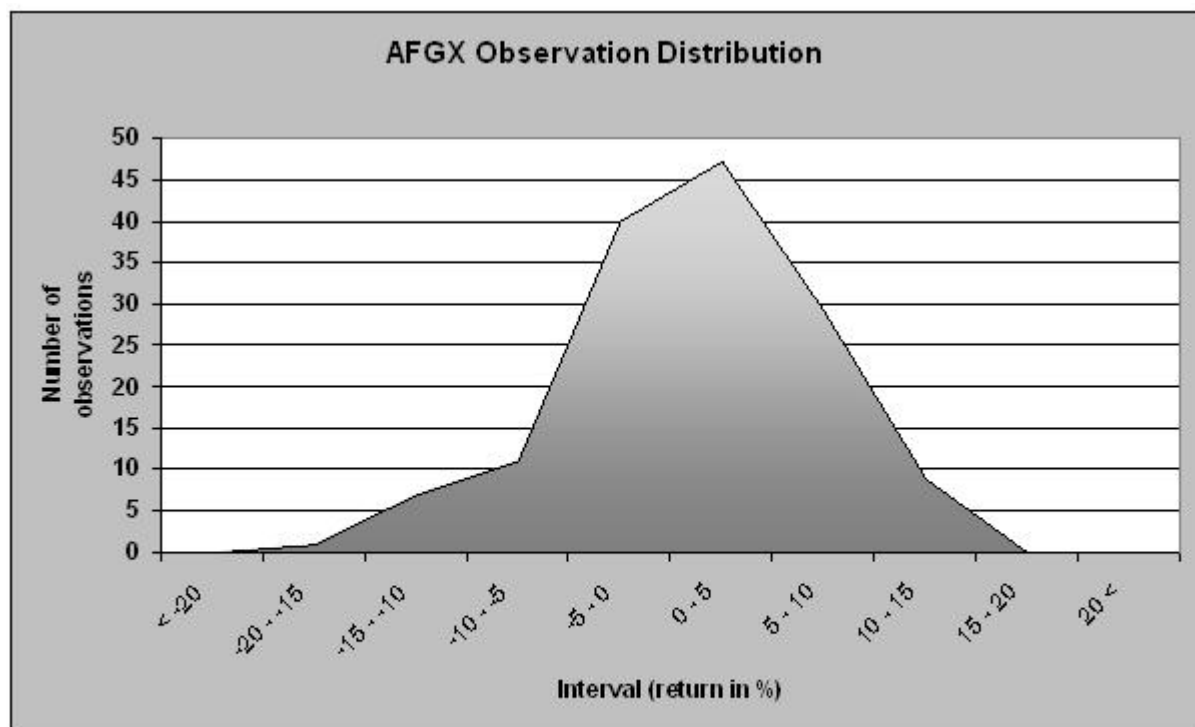


Diagram 1: The diagram shows the monthly return distribution for the AFGX

From the diagram above it can be concluded that the distribution pattern of monthly returns for the AFGX between 1996 and 2007 are, somewhat, normally distributed. The five other indices have also been found to be normally distributed, see appendix 1.

In order to locate if and where the monthly returns diverge from the year average a simple student t-test can be used. T-test of monthly returns for the period 1996-2007:

$H_0: \mu =$ monthly mean for the period (1.04)

$H_1: \mu <$ monthly mean for the period (1.04)

$\mu_i =$ mean return for month i.

Table 1

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.62	2.32	0.19	1.92	-0.21	0.86	-1.42	-0.40	-2.10	2.82	4.48	1.38
Standard Deviation	3.62	6.77	5.72	6.14	4.44	4.19	5.35	6.77	7.53	6.73	6.93	6.69
Z-value	-1.51	-0.66	0.52	-0.50	0.97	0.15	1.59	0.74	1.44	-0.92	-1.72	-0.18
P-value	0.93	0.75	0.70	0.69	0.83	0.56	0.94	0.77	0.93	0.82	0.96*	0.57

Note: * denote significance at the 5% level.

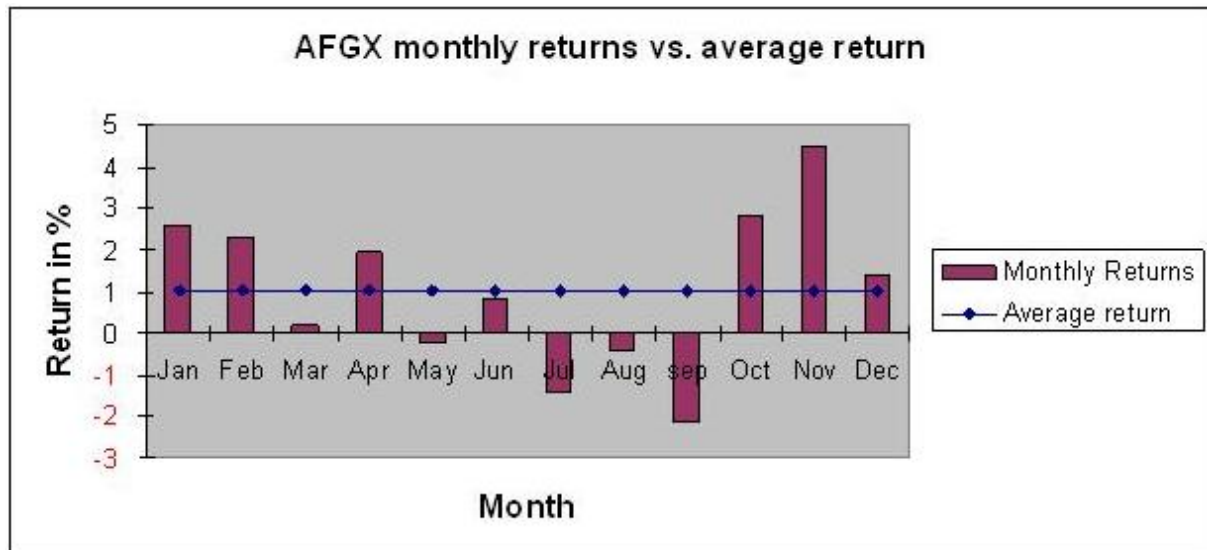


Diagram 2: This diagram shows the monthly returns for the AFGX compared to the year mean, 1996-2007.

The diagram above display a clear and obvious trend in monthly returns for the AFGX (for the other industries, see Appendix 2). The years usually start out with positive returns followed by a decline and in fact negative return during the summer months, only to increase during the last couple of months. The only significant result to be found is that November display an abnormally high return when compared to the yearly mean. The yearly average for the AFGX during 1996 to 2007 is 12.47%.

In accordance with stated methodology the months are sorted into quarters with two different sub-periods acting as summer. The first called Summer 1 uses June, July and August as summer months. The second use July, August and September as summer. As before a student t-test is used to test for the hypothesis that the summer is significantly lower than the rest of the quarters. The t-test is once again set up:

H_0 : μ = monthly mean for the period

H_1 : $\mu <$ monthly mean for the period

μ_i = mean return for month i.

T-test results for summer period 1, 1996-2007 (Summer 1):

Table 2

	Finance	Healthcare	Industrials	IT	Services	AFGX
Winter	2.38 (0.83)	-1.04 (0.84)	2.21 (0.88)	2.89 (0.81)	3.27 (0.81)	2.10 (0.78)
Spring	0.80 (0.82)	3.79 (0.98*)	1.86 (0.81)	-1.11 (0.82)	0.47 (0.85)	0.64 (0.69)
Summer	-0.34 (0.95*)	0.91 (0.53)	-0.40 (0.90)	-2.62 (0.91)	0.54 (0.75)	-0.32 (0.89)
Autumn	2.29 (0.89)	0.60 (0.62)	1.06 (0.57)	3.41 (0.86)	2.14 (0.68)	1.73 (0.75)

Note: * denote significance at the 5% level. Student t-statistic displayed as p-value are in parenthesis.

The only significant results from above are that Healthcare display an abnormally high return in spring with a p-value of 0.98 and the Finance sector has significantly smaller return in summer (p-value of 0.95).

T-test for summer period 2, 1996-2007 (Summer 2):

Table 3

	Finance	Healthcare	Industrials	IT	Services	AFGX
Winter	2.54 (0.75)	-0.39 (0.90)	2.32 (0.90)	0.46 (0.51)	2.65 (0.77)	1.71 (0.75)
Spring	0.75 (0.79)	3.99 (0.96*)	1.45 (0.63)	-0.82 (0.73)	0.98 (0.68)	0.86 (0.57)
Summer	-0.79 (0.91)	-1.12 (0.86)	-1.40 (0.95*)	-3.59 (0.95*)	-0.83 (0.95*)	-1.31 (0.95*)
Autumn	3.22 (0.97*)	2.45 (0.75)	2.32 (0.90)	6.18 (0.97*)	3.66 (0.97*)	2.89 (0.91)

Note: * denote significance at the 5% level. Student t-statistic displayed as p-value are in parenthesis.

In the above table some drastic changes can be seen. The summer period now display significantly lower returns than the quarterly mean in all groups save Finance and Healthcare. The trend, if not always significantly so, is that the summer period display a lower return than other quarters. This is shown through the below diagrams:

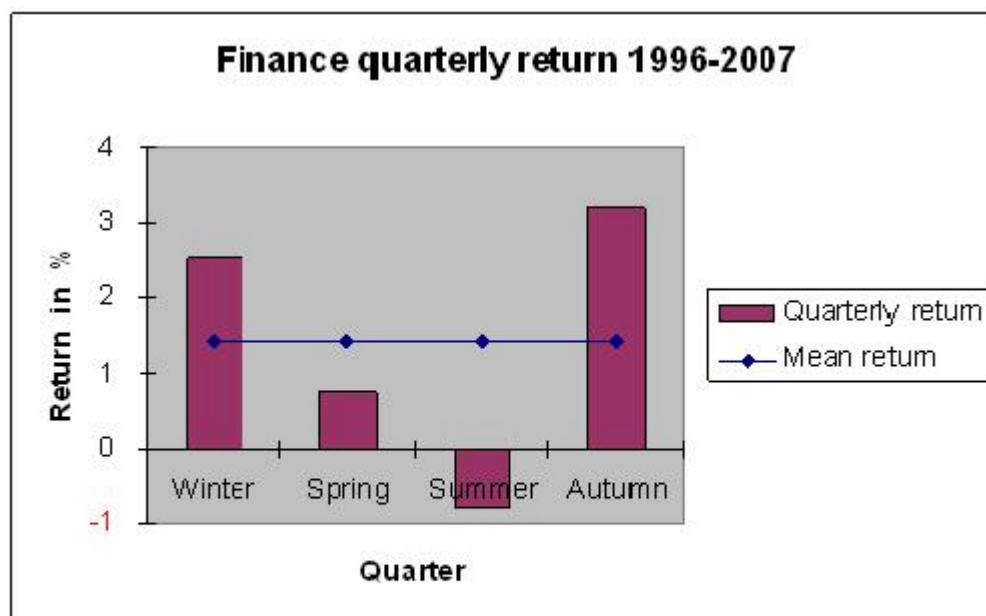


Diagram 3: This diagram shows the quarterly returns for the Finance industry compared to the year mean, 1996-2007 (Summer 2).

In the finance industry the mean for the summer quarter is evidently below zero, it is not however significantly lower than the quarterly mean (p-value of 0.91).

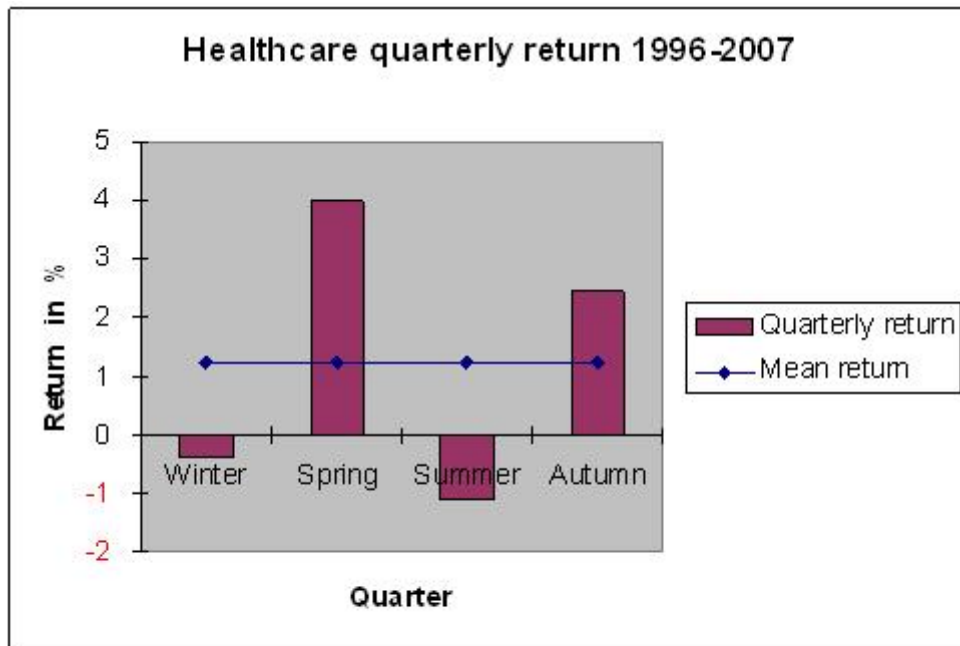


Diagram 4: This diagram shows the quarterly returns for the Healthcare industry compared to the year mean, 1996-2007 (Summer 2).

The healthcare industry also display a summer mean below zero. The p-value is 0.86 and can hence not be said to be statistically different from the quarterly mean.

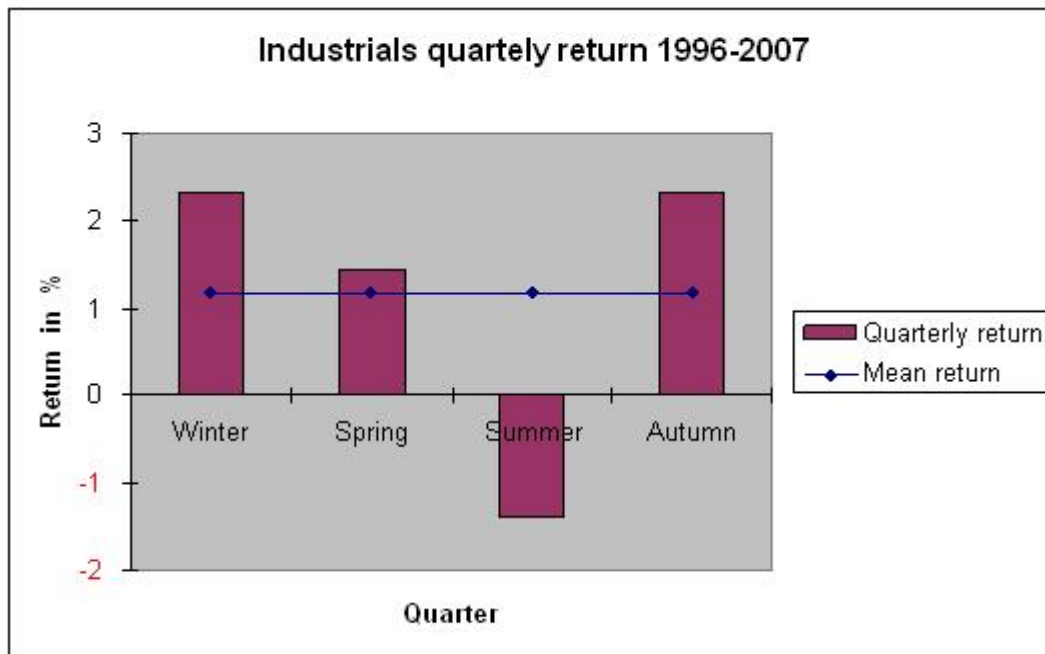


Diagram 5: This diagram shows the quarterly returns for the Industrials industry compared to the year mean, 1996-2007.

The industrials industry has a significantly lower summer mean. The p-value is 0.95*.

The IT industry also displays a summer men below zero and below the quarterly mean. The p-value in this case is 0.95*.

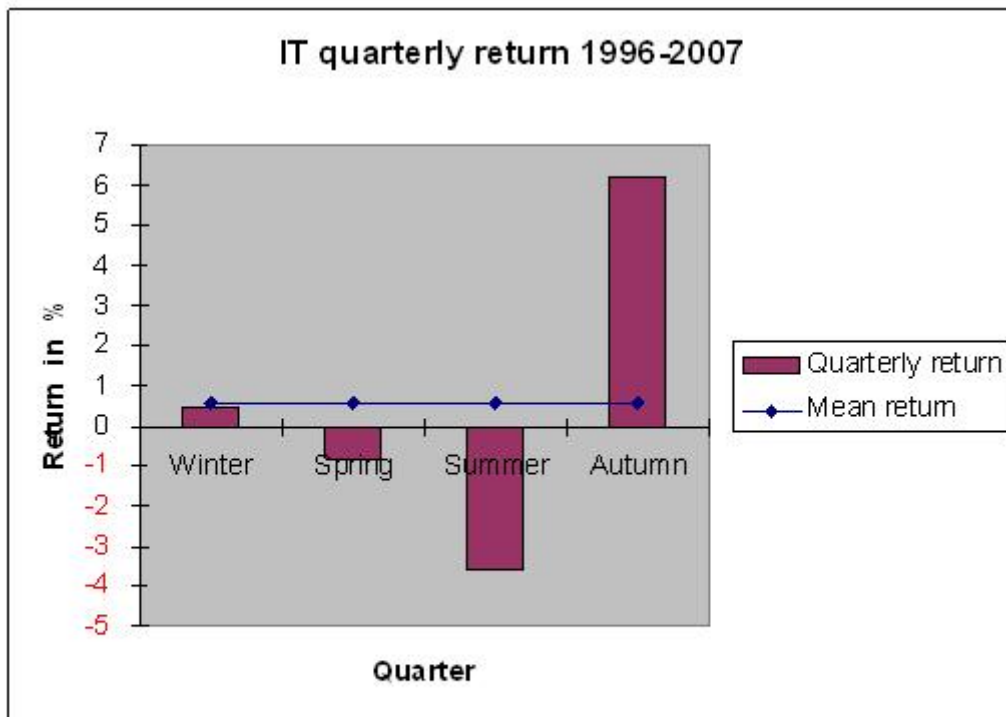


Diagram 6: This diagram shows the quarterly returns for the IT industry compared to the year mean, 1996-2007.

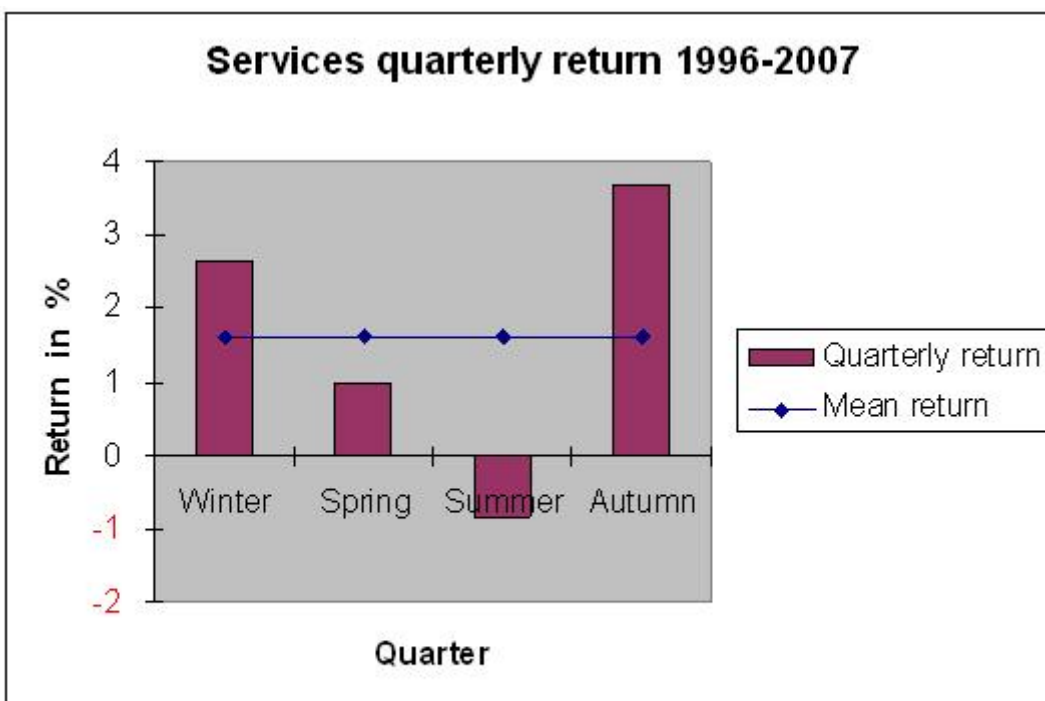


Diagram 7: This diagram shows the quarterly returns for the Services industry compared to the year mean, 1996-2007.

The services industry (above) has a summer mean below zero and statistically significantly below the quarterly mean, the p-value is 0.95*.

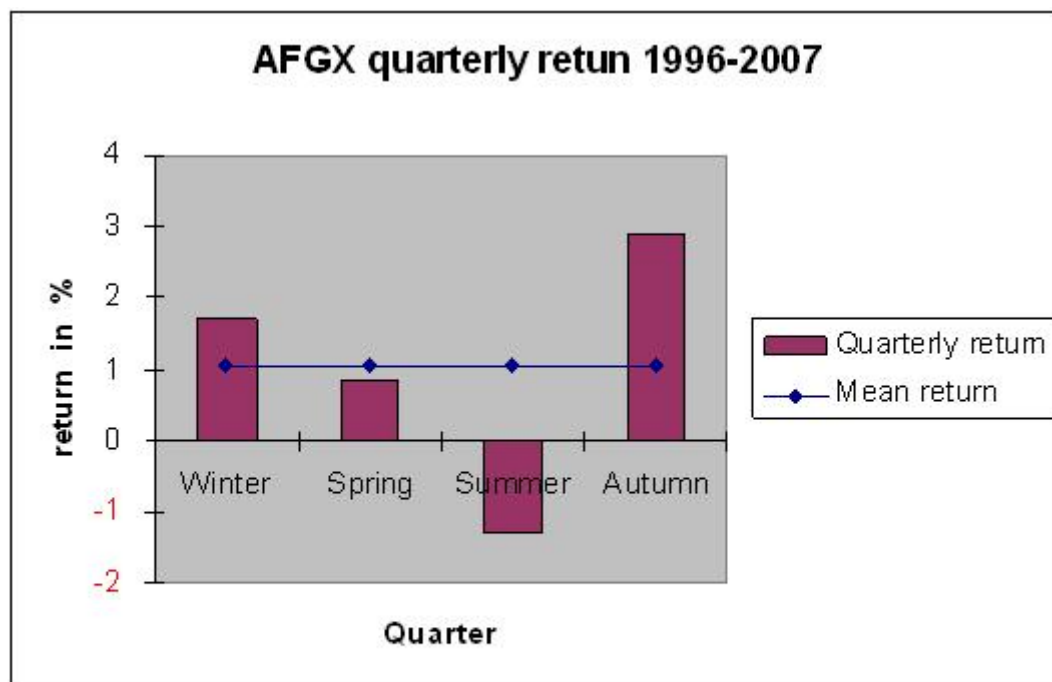


Diagram 8: This diagram shows the quarterly returns for the AFGX compared to the year mean, 1996-2007.

The AFGX as a whole also have a return during the summer months that not only is below zero but also significantly below the quarterly mean (p-value of 0.95*).

OLS-results

When equation (2) was applied using the standard OLS (Ordinary Least Squared) to the six indices used in the paper, four out of the six demonstrated significant summer effects. These, both significant and insignificant are presented in table 4. As with the previous tests performed it is once again finance and healthcare which do not demonstrate significant summer anomalies, whereas industrials, IT, Services and the AFGX as a whole display significant results. One may note that finance, industrials and services also display a significant January effect. This is consistent with existing literature. Why do then not the other two sectors and the AFGX demonstrate a January effect? The model may have some discrepancies not taken into account.

Table 4

	Finance	Healthcare	Industrials	IT	Services	AFGX
α	0.0251 (3.09*)	0.0031 (0.48)	0.0225 (3.0*)	0.0053 (0.76)	0.0261 (3.03*)	0.018 (1.61)
D1	-0.016 (1.88)	0.0444 (0.99)	-0.00534 (2.60**)	-0.0135 (0.88)	-0.0156 (1.68)	-0.0081 (1.08)
D3	-0.0335 (1.02)	0.0068 (1.19)	0.0346 (3.89*)	-0.0466 (5.25*)	-0.0386 (4.71*)	-0.0365 (2.74*)
D4	0.0075 (1.23)	0.033 (1.21)	0.00176 (0.31)	0.05596 (3.59*)	0.0125 (1.67)	0.0111 (1.09)

Note: * and ** denote significance at the 1% and 5% levels, respectively. Students t-statistics are in parentheses.

In their 1997 paper Chen and Chan suggest that recent evidence might imply that expected stock returns, risk premiums and beta risk are in some sense dependent upon time. This of course follows economic intuition but in order to see if this time-varying property in general and the second moment of stock returns in particular are in fact not time-stationary. The residuals are therefore controlled for autocorrelation following equation (3) and for heteroscedasticity (equation (4)). As can be seen in table 5, all indices are exempted from autocorrelation according to the Durbin-Watson statistics. Furthermore, through looking at the chi-square test of heteroscedastic residuals it is concluded that the null hypothesis of no heteroscedastic residuals cannot be rejected for the finance and healthcare industries, i.e. the first order ARCH process. The other industries as well as the AFGX all demonstrate non-stationary second moment of the residuals. In the light of the results presented on table 1, this fact is very interesting. The indices which displayed heteroscedastic residuals is in fact the same ones where there was no statistically significant summer effect to be found. The latest finding leads to the conclusion that the OLS results from above (table 1) might provide valid statistical inference.

Table 5

Industry index	ARCH chi-square	Durbin-Watson
Finance	1.871	2.05
Healthcare	1.105	1.97
Industrials	18.378	2.02
IT	27.621	2.03
Services	17.002	1.82
AFGX	13.682	2.02

Note: autocorrelation and heteroscedasticity tests.

5. CONCLUSION

The summer effect is one of the least well-known and least examined seasonal regularities. Some studies (Graah-Hagelbäck and Kroon, 2005) present the idea that the effect is reasonably new as a phenomena and only being present is the stock exchange since the early 1990s. This master thesis set out to examine whether or not such an effect de facto exist in the Swedish stock market in general and in some sub-indices in particular. The results presented in this thesis strongly suggest that the summer effect not only exist as a general trend in the Swedish stock market but also can be proven to have statistical significance. This fact is easily demonstrated by looking at the AFGX (see diagram 8). The results are however not robust over the five the five sub-indices. The finance and healthcare industries (see diagram 3 and 4) do display a lower risk premium during the summer period denoted as Summer 2 (July, August and September), but the findings cannot be said to be significant. The other three sub-indices industrials, IT and services on the other hand both have visible lower returns during the summer quarter (see diagram 5-7) and have a summer mean for the tested time period that is significantly lower than the quarterly mean.

All in all the results presented here provide strong support for the hypothesis presented in the outset; asset prices do fall below the mean during the summer months. Why is this the case? Is there a mechanism not previously described and explained that can account for this significant drop in value? An ongoing study performed by Hong and Yu (2007) examine data from 51 stock markets and the possible correlation between lower mean stock returns during the summer and a drop in trading activity. They conclude that the relationship between the two factors is not due to time-varying volatility, but instead might be intrinsically linked to the fact that both small and large investors trade less during the time of vacations, typically during the summer months for the countries they observed. When trading activity drops one of the most obvious and interesting consequences is that the bid-ask spread (price of trading) is higher. One conclusion that ought to be drawn from the findings in this paper is that heterogeneous agent models are necessary in order to fully understand asset prices. The ideas presented by Hong and Yu are valuable and should be taken into consideration if and when a follow up on this thesis is made. The link between falling asset prices and drops in trading activity is too important to disregard.

The findings in this thesis are furthermore supported by the findings of Chen and Chan (1997). They found strong summer showings during periods of economic contraction. They could not reject the null hypothesis in their statistical tests for equal returns over the year. Their data revealed that returns are higher during times of economic expansion with the interesting exception of January, July and August. These findings further promote the ones made in this paper and encourage the addition of economic state as a variable when continuing with the study of the Swedish stock market.

What general conclusions can hence be drawn from this study of the indices in the Swedish stock market? First of all, the summer effect as presented by Hong and Yu (2007) for 51 different countries excluding Sweden and the workings of Graah-Hagelbäck and Kroon (2007) including Sweden suggest that the summer effect such as it is defined not only exist but seems to have a dramatic impact on risk premiums. Secondly, modern investors need and should be aware of all various seasonal anomalies in the market. The reasons for this are self-evident, since these seasonal anomalies epitomize unexploited profit opportunities. This fact obviously violates the notion of market efficiency as argued by Fama (1965, 1970 and 1998). Nonetheless the ‘arrival’ of the summer effect does have some serious implications for the efficiency of the market. One fascinating aspect is made clear in the light of the findings of Mehdian and Perry (2002). They made the astounding discovery that the very well-known January effect seem to be diminishing in the post-crash era (post-1987) due to *‘the significant growth in the derivative markets for equities and increased trading by institutional investors who process information faster and at lower transaction costs (Kamara, 1997)’*. This trend in which the market gradually moves to becoming more ‘weakly efficient’, stands in stark contrast to the resulting conclusions from this paper where the rise of the summer effect instead points towards a less ‘weakly efficient’ market. To be able to provide a more holistic point of view with regard to the contemporaneous seasonal anomalies, additional and more elaborate models are needed.

REFERENCES

- Al-Saad, K. and Moosa, I.A. (2005), Seasonality in Stock Return: Evidence from an emerging Market, *Applied Financial Economics*, Vol. 15, pp. 63-71.
- Andersen, I. (1998), *Den Uppenbara Verkligheten – Val av Samhällsvetenskaplig Metod*, Lund, Studentlitteratur.
- Ariel, R. (1987), A Monthly Effect in Stock Returns, *Journal of Financial Economics*, Vol. 18, pp. 161-74.
- Banz, R.W. (1981), The Relationship Between Return and Market Value of Common Stocks, *Journal of Financial Economics*, Vol. 9, pp. 3-18.
- Bera, A.K. and Jarque, C.M. (1980), Efficient Tests for Normality, Heteroscedasticity and Serial Independence of Regression Residuals, *Economics Letter*, No. 6, pp. 255-59.
- Bryman, A. and Bell, E. (2005), *Företagsekonomiska Forskningsmetoder*, Liber, Malmö, First Edition.
- Chan, K.C. (1986), Can Tax-Loss Selling Explain the January Seasonal in Stock Returns? *Journal of Finance*, December, pp. 1115-28.
- Chan, A. and Chen, C.R. (1997), From T-Bills to Stocks: Seasonal Anomalies Revisited, *Journal of Business and Finance & Accounting*, No. 24, June, pp. 573-92.
- Claesson, K. (1987), Effektiviteten på Stockholms Fondbörs, *Ekonomiska Forskningsinstitutet vid handelshögskolan i Stockholm*.
- Cootner, P. (1964), *The Random Character of Stock Market Prices*, MIT Press.
- Corhay, A. Hawawini, G. and Michel, P. (1987), Seasonality in the Risk-Return Relationship: Some International Evidence, *Journal of Finance*, March, pp. 49-68.
- Cross, F. (1973), The Behaviour of Stock Prices on Fridays and Mondays, *Financial Analysts Journal*, Vol. 29, pp. 67-69.
- Dahmström, K. (2005), *Från Datainsamling till Rapport – Att Göra en Statistisk Undersökning*, Lund, Studentlitteratur, Fourth Edition.
- Dahlquist, M. and Sellin, P. (1996), Stochastic Dominance, Tax Loss Selling and Seasonalities in Sweden, *The European Journal of Finance*, Vol. 2, pp. 1-19.
- De Ridder, A. (2003), *Finansiell Ekonomi, om Företaget och Finansmarknaden*, Nordstedts Juridik.
- Dimson, E. and Mussavian, M. (1998), A Brief History of Market Efficiency, *European Financial Management*, Vol. 4, No. 2, pp.

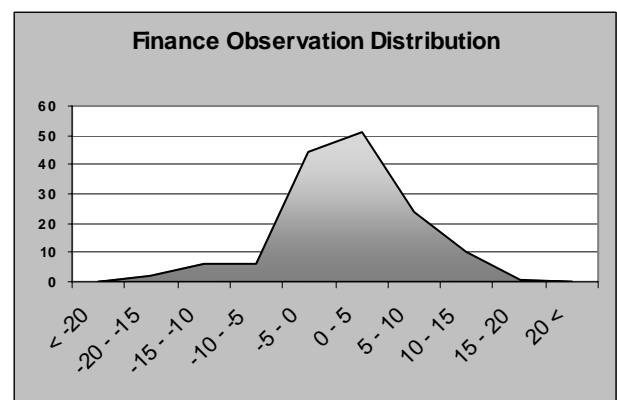
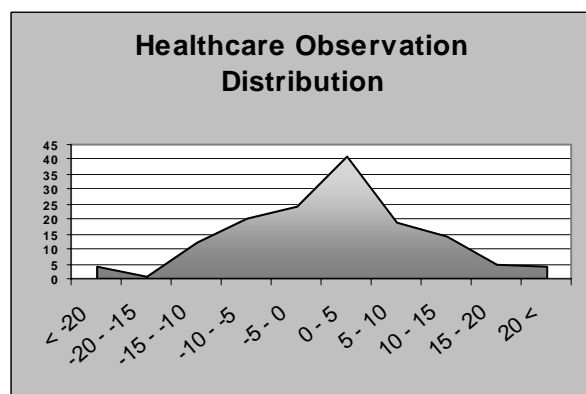
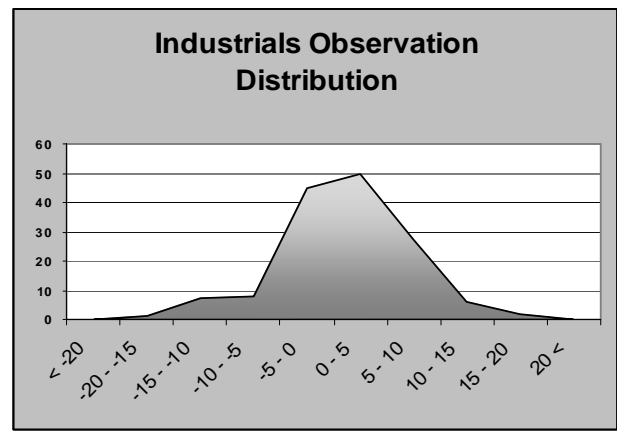
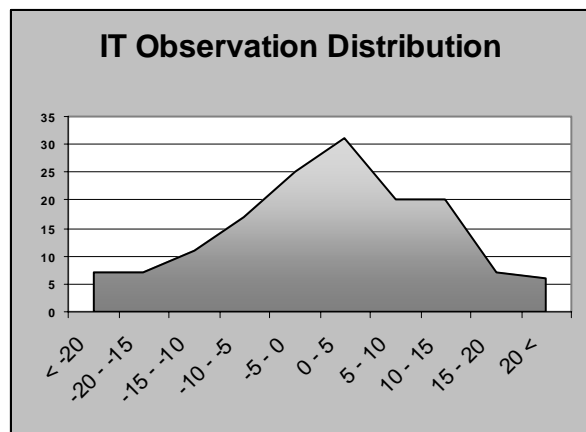
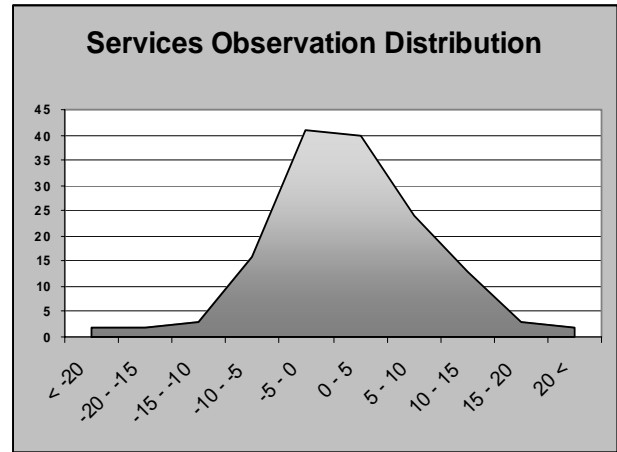
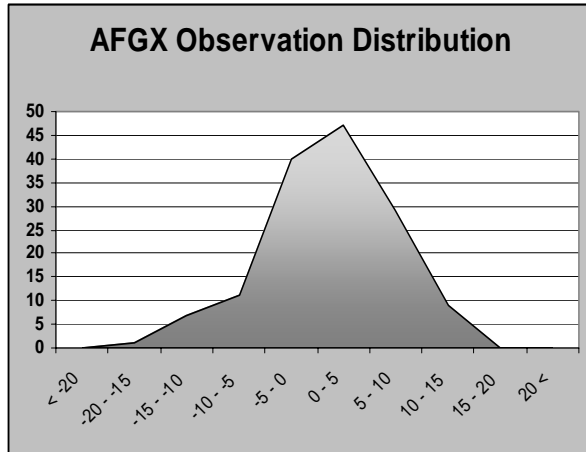
- Engle, R.F. (1982), Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation, *Econometrica*, pp.987-1007.
- Fama, E.F. (1965), The Behaviour of Stock Market Prices, *Journal of Business*, Vol. 38, pp. 34-105.
- _____ (1970), Efficient Capital Markets: A Review of Theory and Empirical Work, *Journal of Finance*, Vol.25, No. 2, pp. 383-417.
- _____ (1998), Market Efficiency, Long-Term Returns, and Behavioural Finance, *Journal of Financial Economics*, Vol. 49, pp. 283-306.
- Fama, E.F. and French, K.R. (1989), Forecasting Returns on Corporate Bonds and Common Stocks, *Journal of Financial Economics*, March, pp. 23-49.
- French, K.R. (1980), Stock Returns and the Weekend Effect, *Journal of Financial Economics*, Vol. 8, pp. 55-69.
- French, K.R., Schwert, G.W. and Stambaugh, R.F. (1987), Expected Stock Returns and Volatility, *Journal of Financial Economics*, September, pp. 3-29.
- Frennberg, P. and Hansson, B. (1992), Some Distributional Properties of Monthly Stock Returns in Sweden 1919-1990, *Department of Economics*, School of Economics and Management, University of Lund.
- Gibbons, M.R. and Hess, P. (1981), Day of the Week Effects and Asset Returns, *Journal of Business*, Vol. 54, No. 4, pp. 579-96.
- Graah-Hagelbäck, C. and Kroon, M. (2005), Semestereffekter på Stockholmsbörsen, *mimeo*.
- Gray, J. (2007), Build a Better Bonus, *Canadian Business*, Vol. 80, No. 2, pp. 65-66.
- Guletkin, M. and Guletkin, B.N. (1983), Stock Market Seasonality: International Evidence, *Journal of Financial Economics*, Vol. 12, pp. 469-81.
- Harris, L. (1986), A Transaction Data of Weekly Intradaily Patterns in Stock Returns, *Journal of Financial Economics*, Vol. 16, pp. 99-117.
- Harris, M. and Raviv, A. (1993), Differences of Opinion Make a Horse Race, *Review of Financial Studies*, No. 6, 473-506.
- Harrison, J.M. and Kreps, D.M. (1978), Speculative Investor Behaviour in a Stock Market with Heterogeneous Expectations, *Quarterly Journal of Economics*, Vol. 93, 323-36.
- Haugen, R.A. (2001), *Modern Investment Theory*, Prentice Hall.
- Haugen, R. A. and Jorion, P. (1996), The January Effect: Still There After All These Years, *Financial Analysts Journal*, Vol. 52, pp. 27-31.

- Hill, C.R., Griffiths, W.E. and Judge, G.G. (2001), *Undergraduate Econometrics*, John Wiley & Sons Inc, New York, Second Edition.
- Holme, I., Krohn, B. and Solvang, M. (1997), *Forskningsmetodik – Om Kvalitativa och Kvantitativa Metoder*, Lund, Studentlitteratur.
- Hong, H. and Yu, J. (2007), *Gone Fishin': Seasonality in Trading Activity and Asset Prices, work in progress*, Princeton University and Columbia University.
- Hyndman, R.J. and Fan, Y. (1996), Sample Quantiles in Statistical Packages, *American Statistician*, Vol. 50, No. 4, November, pp. 361-65.
- Jacobsen, D.I. (2002), *Vad Hur och Varför? Om Metodval i Företagsekonomi och Andra Samhällsvetenskapliga Ämnen*, Lund, Studentlitteratur, First Edition.
- Jaffe, J. and Westerfield, R. (1985), The Week-End Effect in Common Stock Returns: The International Evidence, *Journal of Finance*, Vol. 40, No. 2, pp. 433-54.
- Jones, C.P., Pearce, D.K. and Wilson, J.W. (1987), Can Tax-Loss Selling Explain the January Effect? A Note, *Journal of Finance*, June, pp. 453-61.
- Kamara, A. (1997), New Evidence on the Monday Seasonal in Stock Returns, *Journal of Bussines*, No. 70, pp. 63-84.
- Keim, B.D. (1983), Size-related Anomalies and Stock Return Seasonality: Empirical Evidence, *Journal of Financial Economics*, Vol. 12, pp.32.
- _____ (1989), Trading Patterns, Bid Ask Spreads and Estimated Security Returns: The Case of Common Stocks at Calendar Turning Points, *Journal of Economics*, November, pp. 75-97.
- Keim, B.D. and Stambaugh, R.F. (1984), A Further Investigation of the Weekend Effect in Stock Returns, *Journal of Finance*, Vol. 39, pp. 819-40.
- Körner, S. and Wahlgren, L. (2000), *Praktisk Statistik*, Studentlitteratur, Lund.
- Lakonishok, J. and Levi, M. (1982), Weekend Effects in Stock Returns: A Note, *Journal of Finance*, Vol. 37, pp. 819-35.
- Lakonishok, J. and Smidt, S. (1988), Are Seasonal Anomalies Real? A Ninety-Year Perspective, *The Review of Financial Studies*, Vol.1, No. 4, pp. 403-25.
- Mehdian, S. and Perry, M.K. (2002), Anomalies in US Equity Markets: a Re-Examination of the January Effect, *Applied Financial Economics*, Vol. 12, pp. 141-45.
- Ogden, J.P. (1990), Turn of the Month Evaluations of Liquid Profits and Stock Returns: A Common Explanation for the Monthly and January Effects, *Journal of Finance*, Vol.45, No. 4, pp.1259-72.
- Penman, S. (1987), The Distribution of Earnings News over Time and Seasonalities in Aggregate Stock Returns, *Journal of Accounting Research*, Vol. 22, pp. 153-76.

- Peterson, D.R. (1990), Stock Return Seasonalities and Earnings Information, *Journal of Financial and Quantitative Analysis*, Vol. 25, No. 2, pp. 187-201.
- Pettengill, G.N. (1986), A Non-Tax Cause of the January Effect? *Quarterly Journal of Business and Economics*, Summer, pp. 15-33.
- Reinganum, M.R. (1983), The Anomalous Stock Market Behaviour of Small Firms in January: Empirical Tests for Tax-Loss Selling Effects, *Journal of Financial Economics*, Vol. 12, pp. 89-104.
- Ritter, J.R. (1988), The Buying and Selling Behaviour of Individual Investors at the Turn of the Year, *Journal of Finance*, July, pp. 701-17.
- Rozeff, M.S. and Kinney, Jr. W. R. (1976), Capital Markets Seasonality: The Case of Stock Returns, *Journal of Financial Economics*, October, pp. 379-402.
- Samuelson, P. (1965), Proof that Properly Anticipated Prices Fluctuate Randomly, *Industrial Management Review*, Vol. 6, pp. 41-49.
- Scheinkman, J. and Xiong, W. (2003), Overconfidence and Speculative Bubbles, *Journal of Political Economy*, No. 111, pp. 1183-1219.
- Smirlock, M. and Starks, L. (1984), Day of the Week in Stock Returns: Some Intraday Evidence, Manuscript, University of Pennsylvania.
- _____ (1986), day of the Week and Intraday Effects in Stock Returns, *Journal of Financial Economics*, Vol. 17, pp-197-210.
- Wachtel, S.B. (1942), Certain Observations on Seasonal Movements in Stock Prices, *Journal of Business of the University of Chicago*, Vol.15, No.2, pp. 184-93.

APPENDIX 1

Normal distributions for the five different industries and the AFGX. X-axis indicates the monthly return interval; the Y-axis denotes number of observations.



APPENDIX 2

Table show monthly mean, standard deviation, Z-value and P-value for all five industries and the AFGX for the period 1996-2007. * and ** denote significance at the 1% and 5% levels respectively.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Industry												
AFGX												
Mean	2.62	2.32	0.19	1.92	-0.21	0.86	-1.42	-0.40	-2.10	2.82	4.48	1.38
Standard Deviation	3.62	6.77	5.72	6.14	4.44	4.19	5.35	6.77	7.53	6.73	6.93	6.69
Z-value	-1.51	-0.66	0.52	-0.50	0.97	0.15	1.59	0.74	1.44	-0.92	-1.72	-0.18
P-value	0.93	0.75	0.70	0.69	0.83	0.56	0.94	0.77	0.93	0.82	0.96*	0.57
Finance												
Mean	0.95	3.12	1.00	2.27	-0.87	0.86	-0.93	-0.94	-0.49	2.32	5.03	2.31
Standard Deviation	3.41	8.00	4.87	4.58	3.64	4.26	6.17	7.06	8.67	5.46	6.64	5.27
Z-value	0.27	-0.83	0.16	-0.79	1.99	0.29	1.21	1.06	0.68	-0.70	-1.99	-0.72
P-value	0.61	0.80	0.56	0.79	0.98*	0.61	0.89	0.86	0.75	0.76	0.98*	0.76
Healthcare												
Mean	2.12	-4.11	0.80	6.24	4.31	1.42	-3.25	4.57	-4.68	2.69	3.78	0.88
Standard Deviation	8.54	8.99	7.48	8.66	14.89	8.01	8.01	16.94	9.58	14.53	7.95	7.86
Z-value	-0.36	2.06	0.20	-2.00	-0.72	-0.08	1.94	-0.68	2.14	-0.35	-1.11	0.16
P-value	0.64	0.98*	0.58	0.98*	0.76	0.53	0.97*	0.75	0.98*	0.64	0.87	0.56
Industrials												
Mean	2.28	3.00	1.68	3.43	0.46	0.46	-0.97	-0.71	-2.51	1.92	3.77	1.29
Standard Deviation	4.18	3.46	6.18	6.56	4.78	3.68	6.09	6.78	7.63	6.51	6.62	5.57
Z-value	-0.92	-1.83	-0.28	-1.19	0.52	0.67	1.22	0.96	1.67	-0.39	-1.36	-0.07
P-value	0.82	0.97*	0.61	0.88	0.69	0.75	0.89	0.83	0.95*	0.65	0.91	0.53
IT												
Mean	5.27	-0.32	-3.58	-1.32	1.57	-2.71	-3.09	-2.05	-5.61	4.90	10.95	2.69
Standard Deviation	7.94	11.40	9.44	9.51	9.52	10.13	9.36	12.49	11.64	13.22	17.52	15.07
Z-value	-2.06	0.27	1.52	0.68	-0.37	1.12	1.35	0.72	1.84	-1.14	-2.05	-0.49
P-value	0.98*	0.61	0.94	0.75	0.64	0.87	0.91	0.76	0.97*	0.87	0.98*	0.69
Services												
Mean	0.95	6.01	1.01	1.65	-1.27	2.55	-0.68	-0.27	-1.54	3.06	4.89	3.04
Standard Deviation	5.32	8.88	6.44	7.67	6.67	8.24	6.43	9.83	7.03	4.62	8.95	8.13
Z-value	-0.62	-2.34	-0.54	-0.75	0.66	-1.07	0.36	0.09	0.76	-2.29	-1.90	-1.29
P-value	0.73	0.99**	0.71	0.77	0.75	0.86	0.64	0.54	0.78	0.99**	0.97*	0.90

Note: * and ** denote significance at the 1% and 5% levels, respectively.