Major Football Events and the Dutch Stock Market: Do football results lead to market anomaly?

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Abstract

This paper aims to find the relationship between football results and the Dutch stock market. I will be using the daily data of Amsterdam Exchange Index (AEX) with the period of observation from October 1986 to July 2010. The football results used are the Netherland national football team match results on World Cup and Euro Cup. The methods employ in this study are Ordinary Least Square (OLS) and Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. I find that football results do not affect the Dutch stock returns, implying that the Dutch stock market is efficient.

I also re-examine the finding of Ashton, Gerrard, Hudson (2003), in which they find a statistically significant relationship between England national football results and the London Stock Exchange. This re-examination aims to investigate whether or not their finding can be confirmed. Additionally, the results of this re-examination can be used as a useful benchmarking tool considering the high popularity of football as a sport in both the Netherlands and England.

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Chapter 1
Introduction

Rationality refers to the quality or state of being rational[1]. It is the state when one acts merely in the pursuit of goal attainment and based their actions on several sets of logical reasoning. In finance, rationality causes market exploitation becomes impossible. However, Wachtel (1942) observes the January effect, a phenomenon where the performance of the stock market enjoys higher gains in January than any other time of the year. In his paper, he concludes that the higher return in the month of January is due to the psychological behavior of 'feel good factor' throughout the Christmas holiday. It marks the beginning of awareness of the important role of psychological factor in influencing investors' decision.

The finance literatures nowadays give much attention to behavioral finance focusing irrational behavior of the investors. Numerous studies have documented the effect of psychological factors and irrational investor behaviors on stock markets. Dowling and Lucy (2005) investigate weather, biorhythms and beliefs effect on Irish stock exchange. They find a statistical relationship between Irish stock returns and several variables such as daylight saving time changes, Winter solstice, Spring equinox and lunar phases. They further conclude that abnormal returns are not only resulted from company events or announcement, but also from investors' moods that get affected by the weather.

The effects of sporting results on the stock market have initially analyzed by Ashton, Gerrard, Hudson (2003). He examines the effect of England national team success on FTSE100 index returns. They find that good (bad) performances by national teams are followed by good (bad) market returns. Edmans, Garcia, Norli (2007) conduct a cross section study for 39 countries to investigate the relationship between international football results and stock returns. Their study finds a strong association between sport sentiments and stock returns. Kaplanski and Levy (2010) extend Edmans et al (2007) study in an attempt to exploit the effects of the world cup events on the U.S stock market. They gather the US stock returns from 1950 to 2006. Their study finds that

returns on the US market over the world cup period is -2.58%, while all days average returns over the same period of length is +1.21%.

Inspired by Edmans et al. (2007), I will examine the effect of football matches results on the Dutch stock returns. I find this as an interesting topic as football is the world's most popular sports, including to the Dutch people. According to FIFA's official website, the cumulative television audience of the 2006 World Cup Germany reached more than 26 billion people, while it is more than 8 billion viewers for UEFA Euro 2004, making the World Cup and Euro Cup the biggest sporting events in the world and Europe respectively. The Netherlands is also one of the nations whose citizens consider soccer an important part of their lives. A recent survey by ING reveals that one in every five Dutch people would be prepared to give up more than a full working week in exchange of winning the world cup[2] Hence, given the interesting facts, I would like to examine whether or not the football results lead to abnormal returns on the Dutch stock market.

1.1. Overview of the Dutch stock market

The Dutch Stock Market (Amsterdam Stock Exchange) is the first stock exchange in the world. Besides that, Amsterdam Stock Exchange is also the place where derivative instruments were created. In the year of 2000, the Amsterdam Stock Exchange merged with the Brussels and Paris Exchange and form Euronext Amsterdam.

The Dutch stock market consists of three indices, namely Amsterdam Exchange Index (AEX), Amsterdam Midkap Index (AMX) and Amsterdam Small Cap Index (AScX). AEX represents the funds that rank 1-25 in size, while funds that rank 26-50 and 51-75 are represented in the AMX and AScX respectively. As I will be using the main index which is Amsterdam Exchange Index, I will be focusing on the AEX profile below.

The Amsterdam Exchange Index (AEX) is the composite stock market index of 25 of the most actively traded companies on Euronext Amsterdam. The index started on 3 January 1983 as European Options Exchange. At the start of the operation, they listed

13 companies and had an established base level of 45.38 (100 points Dutch guilders). The index name changes to AEX on 1 January 1994. According to the latest report from Euronext Amsterdam in 2009, the market cap amounted to € 349.8 billion. The average market value of AEX is 283.67 points. AEX index reached a historical peak to date of 703.18 on 5 September 2000 due to dot-com bubble[3]. The price decreased to half of the value during the next three years.

1.2. Overview of FIFA World Cup and UEFA Euro Cup

Fédération Internationale de Football Association (FIFA) World Cup is the men football national competition that is governed by FIFA. The championship has been held for 19 times since 1930, with the exception of the year 1942 and 1946 due to the Second World War. The current format of the event is divided into two parts: qualification phase and World Cup finals (the one-month event on June-July). In qualification phase, each country is divided according to their continental zone. National teams then compete to get to the top 32 teams that will play in the event (World Cup Final).

Brazil is the most successful team in the history of world cup. They have won five times as well as the only team to have played in every tournament since 1930[4]. Another winner is Italy (4 titles), Germany (3 titles) Argentina and Uruguay (2 titles each) and England, France and Spain (1 title each). The Netherlands also have written success in the World Cup by playing in the final matches for three times (1974, 1978 and 2010).

The Union of European Football Associations (UEFA) Euro Cup is the second largest football events in Europe. It is held every four years in the even numbered year between the World Cup. The game rules are similar to the World Cup. Spain is the latest as well as two times champion of the Euro Cup.

1.3. Purpose of the study

The purpose of this study is to find out whether football results influence the Dutch stock returns. I hypothesize that the Dutch stock market is unaffected by the outcomes of football results. This hypothesis implies that the market is efficient and investors are

rational. Hence, the alternative hypothesis will indicate that wins and losses will lead to abnormal returns on the day following the game, with losses give more negative impact due to people's loss aversion (Kahnemann and Tversky, 1975)

1.4. Contributions of the study

This study contributes to the existing literature in several ways. Firstly, despite Edmans et al. (2007) have included Netherlands as one of the 39 countries that they study, there has not been a comprehensive study that covers Netherlands football result effects on its stock return. In this study, it is expected that the magnitude of the impact (if exists) will be captured as well as the possible explanation of the phenomenon. Secondly, this study extends its study sample to the latest 2010 World Cup, where Netherlands become a runner-up against Spain. Thus, as Edmans et al. (2007) demonstrate that the loss effect will be higher the more importance the game, the latest event results will be a good documentation to support or against the study. Finally, this study also re-examines the known results of Ashton et al (2003) by using the same methodology used in this study. It is hoped that their results could be confirmed in terms of the validity of the results. We can also use the England's football results impact on its stock market as a benchmarking attempt between the Netherlands and England footballs.

The results of this study show that football results do not significantly affect the Dutch stock market. Thus, the assumption that the market is efficient and investors are rational is applied here. The results prove that the Dutch stock market is efficient even after the outliers are trimmed. I assume that the larger proportion of foreign investors in the Dutch stock market and the relatively smaller football industry in the Netherlands may be the reasons why football results do not affect the Dutch stock market. However, further research is needed to prove these assumptions.

1.5. The arrangement of the paper

The structure of the thesis is the following. Chapter 2 reviews the theoretical framework. Chapter 3 describes the literatures relevant to this topic. In Chapter 4, the properties of the data and the methodology behind the selected models are described. Chapter 5 analyses the results, reliability of the models, and possible explanation of the phenomenon. Finally, Chapter 6 provides some concluding remarks.

Chapter 2
Theoretical Framework

2.1. 'Normal' and Abnormal Return

The 'normal' return, which also called the expected rate of return, is the estimated returns based on asset pricing model (CAPM). The 'normal' return is estimated using a long run historical average or multiple valuations. Abnormal return, on the other hand, is the difference between the expected return (normal return) and the actual return over a set of time. Abnormal return is usually triggered by events; such as dividend announcements, mergers, Initial Public Offering (IPO), interest rates increase, and so forth. Psychological factors such as losses in football matches, weather and beliefs, also affect the stock market. Abnormal return characterizes the violation of efficient market theory, a condition where events and news are not reflected in the stock prices. It is calculated as follows.

$$\text{Abnormal Return} = \text{Actual Return} - \text{Normal Return}$$

As an example, if the stock index on Monday increases by 6%, while the expected (normal) return is 2%. Then we can say that there is an abnormal return by 2% on that Monday. Single stock can also experience from abnormal return if the stock movement is higher or lower than the average market returns. In this study, we will examine whether football results lead to abnormal returns on the Dutch stock market.

2.2 Efficient Market Hypothesis

The Efficient Market Hypothesis (EMH) was first expressed by Louis Bachelier in his PhD thesis "The theory of Speculation". The theory was largely ignored until 1970, when Eugene Fama reviewed and developed the empirical evidence for the theory. This theory lies in the assumption that at any given time, all available information is

reflected in prices. In an efficient market, assets trade as fair value, as prices reflected all the available information. This condition makes outperforming the market become impossible for investors.

Several characteristics that an efficient market should posses are: (1) There should be no barrier to enter the market, (2) there is a perfect competition, (3) the assets are tradable, (4) no transaction costs, (5) the information is readily available for everyone to access, (6) no tax, and (7) no government intervention.

The characteristics mentioned above are hard to be fulfilled in real life. This happens because transaction costs are charged for every transaction. Besides that, there is also asymmetric tax as well as the asymmetric information between one investor and another. However, Fama (1991) improves his EMH theory by expanding the concept of the weak form efficiency to include the *tests for returns predictability*. He also changes the title of semi-strong efficiency to *event studies* and strong efficiency to *test for private information*. I will discuss the forms of market efficiency Fama (1970) along with the expanded concept together in the next section.

2.1.1 Forms of Market Efficiency

The EMH I (1970) and Efficient Capital Market II (1991) consist of three categories.

1. ***First category***

1a. Weak-form efficiency (1970)

The weak-form states that the current asset prices already reflect all past publicly available information. This form of EMH suggests that it is useless for investors to predict the future prices by finding the historic price pattern, as all historic information is already reflected in prices.

1b. Returns Predictability (1991)

The returns predictability test rejects the old weak-form efficiency that supports constant expected returns model. The returns predictability states that returns are predictable not only from past returns, but also from dividends yields, and various term-structure variables. This new results lead to joint-hypothesis problem: *Does return predictability reflect*

rational variation through time in expected returns, irrational deviations of price from fundamental value, or some combination of the two?[5] Fama insists that the market is still real and rational, as much predictability in returns may be spurious. He also confirms that the test adds knowledge of the behavior of returns despite its implication on market efficiency.

2. *Second Category*

Semi-strong form efficiency (1970) → Event Studies (1991)

In the second category of efficient capital market, prices are influenced by all publicly relevant information and that prices instantly change to reflect new publicly available information. Investors who investigate news will not gain abnormal returns as all the information is instantly reflected in prices. Studies of the semi-strong form of the efficient markets hypothesis can be categorized as tests of the speed of adjustment of prices to new information[6]. Event study is the principal research tool in this area. An event study is a statistical method to assess the impact of an event on the value of a firm. This study is done by accumulating the performance of stocks from specified time periods before an event until a specified period after the event occurs.

The first two categories of EMH imply that no investors are able to outperform the market by using publicly available information.

3. Third Category

Strong-form efficiency (1970) → Private Information (1991)

The third category states that private information or inside information is reflected into the price of assets. Hence, both public and private information are instantly reflected in the price.

2.2. Criticism of Efficient Market Hypothesis: Behavioral Finance

The EMH theory was largely accepted until behavioral finance theorists become main stream in economics. Behavioral finance assumes that "psychology is the basis for human desires, goals and motivations, and it is also the basis for a wide variety of human errors that stem from perceptual illusions, overconfidence, over-reliance on rules of thumb, and emotions" (Shefrin, 2002). Prior to that, Kahnemann & Tversky (1979) observe a concept of loss aversion, a condition where people are twice as affected by a $1 loss than $1 gain and thus they prefer to avoid loss than to gain profit. This condition contradicts one of the assumptions that an efficient market should posses, in which investors are rational. Hence, this branch of economics states that investors might behave irrationally and that investor population is not rational on average.

Empirical evidences also revealed a condition that contradicts the EMH theory. For example, stocks with lower price in comparison to their returns have better performance than other stocks. This inefficiency causes investors to choose more volatile stocks than stocks with more stable value. In addition to that, there are several evidences that contradict EMH, in which a pattern of seasonality is found in capital markets. This market deviation is also called market anomaly.

2.3. Stock Market Anomaly

Market anomaly could be defined as a phenomenon in which one or several assets performance lead to abnormal returns and contradict Efficient Market Hypothesis. There are several types of market anomaly.

1. **Fundamental Anomaly**

   This anomaly deals with the fundamental analysis of the financial information of the company. The fundamental financial information includes the revenue, expenses, liabilities, cash flow and so forth. Examples of this anomaly are value effect (positive relation between security returns and the ratio of accounting based measures of cash flow or value to the market price of the security), size effect (negative

relationship between security returns and market value of the common equity) and so forth.

2. **Technical Anomaly**

   Technical anomaly contradicts the weak-form of EMH that states technical analysis on the price history is useless to give advantage for investors. Momentum effect is the example of this anomaly.

3. **Calendar Anomaly**

   Calendar anomaly creates patterns in stock returns; ranging from day of the week effect (e.g. Monday effect), turn of the month effect (January effect) or turn of the year effect (years-ending-in-five effect).

2.4. Possible Explanations for Calendar Anomalies Phenomenon

Several studies have tried to find explanations for calendar anomaly. When bad news occurs in the weekend, the inability of investors to react forces them to postpone their reaction until Monday. This behavior causes Monday return to be the lowest return within a week (Gibbons et.al, 1981). Another explanation of Monday effect phenomenon is because individuals net selling is at the highest on Monday (Kamara 1997) in order to fulfill their needs of liquidity for the week (Lakonishok & Maberly, 1990). Another noteworthy calendar anomaly, January Effect, can be explained as a result of tax selling (Keim, 1989). Keim (1989) also suggests that investors who are income-tax sensitive, sells (underperformed) stocks before the end of the year for tax purposes in order to reduce the amount of tax that they need to pay and then reinvest in the month of January. That results to the lower stock price in the month of November and December and higher price in the month of January.

Chapter 3
Literature Reviews

At the time when researches mainly focused on examining the economic impact of hosting major sports events, Ashton et al. (2003) try to examine what has not been researched before: the economic impact on national football team success. This made them the first to study this field before several other researchers follow at different locations with various methods.

In their study, Ashton et al. (2003) examine the relationship between the performance of the England national football team (win, draw or loss) and daily changes in the FTSE 100 index. The FTSE 100 index is gathered from 6 January 1984 to 3 July 2002, and the first trading day return after each game is used. They use three stage methods; namely the mean return after the game results and the binomial test. This test intends to test whether the expected returns on the next trading day is greater than or less than the unconditional mean returns after a winning (losing) game. The results indicate that good (bad) performances by the national team are followed by good (bad) market returns.

Klein, Zwergel, Fock (2009) replicate Ashton et al. (2003) study. They, however, find different results from Ashton et al. (2003). They argue that the distortions that occur in Ashton et al (2003) results were due to holiday returns effect, the 'copy and paste' effect and the globalization effect. The corrected results that they obtain indicate that the mean return is less negative after losses, less positive after wins and positive after draw except on tournament finals.

Boyle and Walter (2003) study the effect of national rugby team success on stock returns in New Zealand Stock Exchange. Considering the importance of AB rugby team and the personal attachment of many New Zealanders to their rugby team, Boyle and Walter would like to examine whether the strong psychological and emotional attachment of AB success and failure will be reflected in investor behavior. Initially they use both OLS and GLS methods as the preliminary analyzing using OLS indicated significant autocorrelation. The findings support the efficient market hypothesis

theory, in which stock returns behavior in NZSE is independent of the success of the rugby national team. Further, they argue if market reaction occurs it must be transitory.

Tufan (2004) using hourly returns from 31 May 2002 until 28 June 2002 from Istanbul Stock Exchange (ISE) 100 Index to examine the effect of world cup to Istanbul Stock Exchange. He employs descriptive statistics and Mann-Whitney U-Test in order to analyze the data and finds that the World Cup event does not affect the Istanbul Stock Exchange.

Edmans, Garcia, Norli (2007) investigate the effect of investor sentiment on assets prices. They use the international football results from 39 countries from January 1973 through December 2004 as the main mood variable. They complement the study with results from other sports such as cricket, rugby, ice hockey and basketball events. The result shows a significant relation between football matches and stock returns. The results point out that daily stock returns decrease after losses in World Cup elimination matches. They show a significant relation between football results and stock returns. Loss effect is also found after other international sports events like cricket, rugby, and basketball games. They find that losses in football matches have an economically and statistically significant negative effect on the stock market.

Klein et al. (2008) extend the study by Ashton et al. by using a longer time frame from 1990 to 2006 and included several other European football teams, namely Belgium, Czech Republic, Denmark, England, France, Germany, Greece, Italy, Portugal, Sweden, Switzerland, Spain, the Netherlands and Turkey. They employ simple constant mean model and a more sophisticated model of Markov-switching two-state market model. From these two models, the results indicate strongly that there is no connection between a football game result and stock price movements.

Table 1 Summary Table of Literature Reviews

Author(s), Year	Research Topic	Sample	Methodology Used	Results
Ashton, Gerrard, Hudson (2003)	National team success on the England stock returns	FTSE 100 index from 6 January 1984 to 3 July 2002, football results	Binomial Returns And Generalized Methods of Moments (GMM)	The results indicate that good (bad) performances by the national team are followed by good (bad) market returns
Klein , Zwergel, and Fock (2009)	*Replication study of Ashton et.al (2003*	*Replication study of Ashton et al. (2003)*	*Replication study of Ashton et al. (2003)*	The returns are less negative following losses and less positive following wins
Boyle and Walter (2003)	The effect of national rugby team success on stock returns in New Zealand Stock Exchange	Monthly data of NZ stock market from January 1950 to December 1999. AB rugby team match results	Ordinary Least Square (OLS) and Generalized Least Square (GLS)	stock returns behavior in NZSE is independent of the success of the rugby national team
Tufan (2004)	The effect of World Cup on Istanbul Stock Exchange (ISE)	Hourly data from 31 May 2002 until 28 June 2002 from ISE, football results on the same period	Descriptive Statistics, Mann-Whitney U-Test	World Cup event does not affect the Istanbul Stock Exchange
Edmans, Garcia, Norli (2007)	Effect of investor sentiment on assets prices	International football results from 39 countries from January 1973-December 2004	OLS,Generalized AutoRegressive Conditional Heteroskedasticity (GARCH)	Losses are followed by next-day abnormal stock returns on the losing country's stock market. Wins, however, do not give impact to stock returns
Klein, Zwergel, Herden (2009)	Extended Ashton et.al (2003) to several countries in Europe	Football results from 1990 to 2006 of ten European countries	Constant Mean Model and Markov Switching two-state market model	There is no connection between a football game result and stock price movements

Chapter 4
Data and Methodology

4.1. Data

The data used in this research is time series in nature. The stock returns data are generated from Datastream. The data cover AEX composite index from 1 July 1988 to 20 July 2010. The football results are compiled from FIFA and UEFA official websites as well as Wikipedia.com. The data used are daily data, where there are five trading days per week (Monday, Tuesday, Wednesday, Thursday and Friday). If, within a period of one week, there are days where no trading occur due to holiday, returns on shares on that particular day will be considered zero. These days will not be included in the model. This is done in order to obtain a better description of returns of the Dutch stock market.

In World Cup, national teams play against each other in the preliminary stage to qualify for a place in the World Cup Finals. At the World Cup finals, each team is divided into a group of four. Then each team play to qualify for the top two positions of each group in order to advance to the elimination stage. Team that wins all the elimination stages will become the World Cup winner. The same game rules also apply for UEFA Euro Cup.

Relating to my research, the football result that I am going to use in this sample covers the last six World Cups, from the preliminary rounds of world cup in 1998 to the latest 2010 World Cup with the total of 76 matches. To measure the effect of world cup results on stock prices, I use the returns on a stock market index on the first trading day after the game. Despite only few games are played when the stock market is open, I choose to use the first trading day following the game as the number of matches in that category is remarkably small as well as to capture the full day returns when the game outcome is known.

Stock returns are measured as the daily percentage change of the returns. The calculation is shown below.

$$R_t = (ln\ I_t - ln\ I_{t-1})\ x\ 100$$

Where R_t is the return on period t, I is the daily share returns for index period t and ln is the natural logarithm.

Since there are many matches played between Friday and Sunday afternoon, I measure the daily returns on Monday. This may, however, induces a spurious correlation between soccer results and stock returns. I will be dealing with these issues in the next section.

4.2 Econometric Approach

Due to the nature of time series data, it is necessary for me to perform a stationary test to the composite index returns. The stationary data are the data which the mean and variance does not experience systematic change over time, in other word, constant. I will be using Augmented Dickey-Fuller test with the null hypothesis of there is a unit root.

I will next conduct a test to observe the influence of World Cup soccer match results on the Dutch stock market. The null hypothesis is that Dutch stock market is unaffected by the outcomes of world cup soccer matches. This null hypothesis supports the efficient market hypothesis theory, in which market is efficient, and investors are rational. The alternative hypothesis is that world cup match outcomes affected the Dutch stock market by a positive reaction after wins and negative reaction after losses.

To estimate the impact of wins and losses, I use Ordinary Least Squared (OLS) regression, with day of the week dummy variable as well as days after non-weekend holiday to control the Monday effect, holiday effect and other confounding effects. The dummy variable takes a value of one for a given day and a value of zero for all other days and regress the following model.

$$R_t = \gamma_0 + \gamma_{1i} R_{t-1} + \sum_{i=1}^{4} \gamma_{2i} D_t + \sum_{i=1}^{5} \gamma_{3i} H_t + \varepsilon t$$

where R_t is the daily return; γ_0 is the regression intercept coefficient; R_{t-1} is the previous day return, *Dit*, *i* = 1, . . . , 4, are dummy variables for the days of the week: Monday, Tuesday, Wednesday, and Thursday, respectively; *Ht* is a dummy variable for days after a non-weekend holiday.

The model above has been modified from the original model by Edmans et al. (2007). $R_{t-1,}$ the previous day returns, is included to account for first order serial correlation. However, as this research focuses only on one country, world market index is not necessary to be included in the model.

Let $\widehat{\varepsilon t}$ be the residuals of regression above. The effect of the of major football events results can be estimated using the regression model of:

$$\widehat{\varepsilon t} = \beta_0 + \beta_w W_t + \beta_l L_t$$

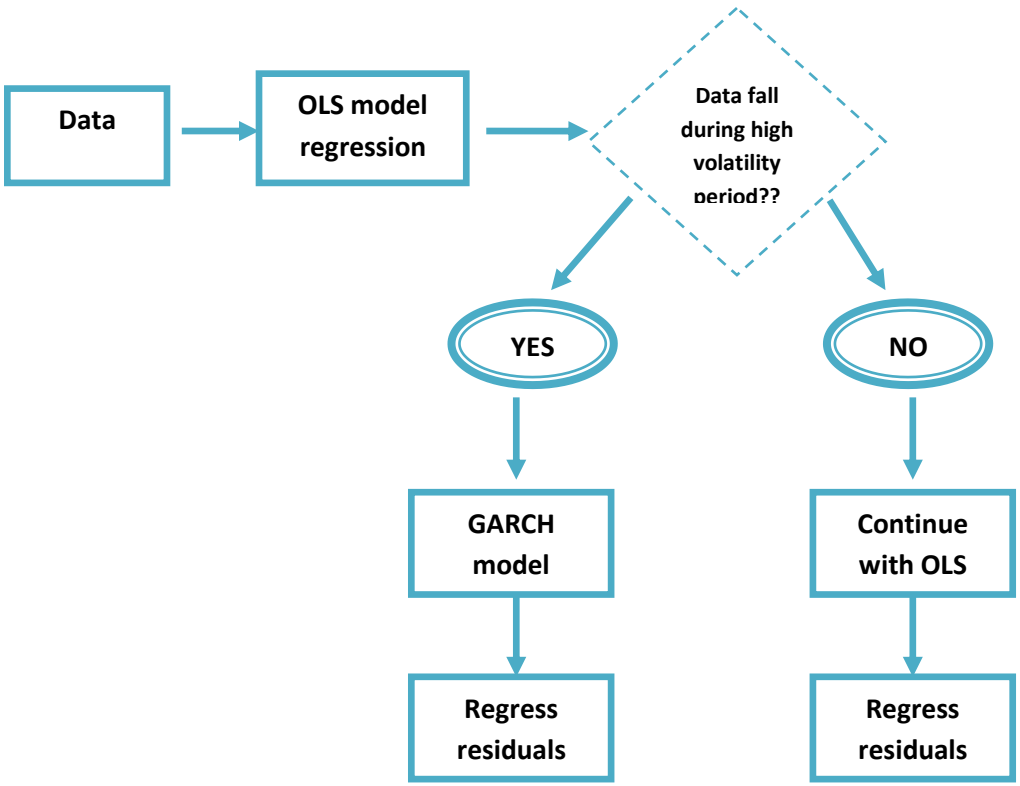
where W_t is dummy variable for wins and L_t is dummy variable for losses.

If the samples fall during the period of high volatility, then to address this issue I model the stock returns volatility using a GARCH model as generalized by Bollerslev (1986). GARCH model is used because it can substitute ARCH with unlimited order. The use of GARCH (1,1) is a better alternative compared to the use of ARCH with high order.

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i {\varepsilon^2}_{t-i} + \sum_{i=1}^{p} \gamma_i {\sigma^2}_{t-1}$$

Where σ_t^2 the index returns volatility on day t. The normalized returns R_t^0 that I find from this model will be used to obtain the second residual that will be denoted by $\breve{\varepsilon}_t$.

Summary of the econometrical modeling used in the study



Chapter 5
Results and Analysis

In this section, the results from descriptive statistics tests and econometric approach will be exposed and analyzed. This section also includes the re-examination results of the study of Ashton et.al (2003), where they examine the economic impact of England national team success on FTSE100 index.

5.1. Descriptive Statistics

In total, there are 6051 observations from 1 October 1986 to 20 July 2010, in which the data including six UEFA Euro Cup and six FIFA World Cup matches and the qualifications. From all of the observations, 5902 trading days are not associated with a soccer match. The average returns and standard deviation for these days are 0.04% and 1.40% respectively. The standard deviation of returns is higher on days after the matches compared to days where there are no matches, in which the standard deviation on days following a match is 1.86% and where there is no match 1.37%.

During the period of observation, the Netherland national football team makes 99 wins and 24 losses. The average returns on days after wins is 0.02%, while surprisingly, the average returns on days after losses is slightly higher than wins by 0.05%. These results are contrary to what Edmans, Garcia, Norli (2007) found, in which they found a significant market decline after football losses. The average return for both Euro and World Cup is 0.17% while it is 0.05% on days after qualification matches. Although the average returns of days after the matches are higher compared to days when there are no matches, there has not been a significant difference between the average returns on days following wins and losses in soccer matches. Further, the average return following wins (loss) in the event days and qualification is -0.20% (0.07%) and 0.1% (0.66%) respectively while it is 0.07% and 0.66% following a loss. Again this is contradictory to what Edmans et.al (2007) findings in which the loss effect is stronger the important the games.

The evidence in Table 2 suggests that world cup matches result do not correlate with the Dutch stock returns. The standard deviations are given in parentheses.

	Mean (Standard Deviation) ***all numbers are in percentage***		
	Overall	**Main Events**	**Qualifications**
No Matches	0.04 (1.40)	N/A	N/A
Win	0.02 (1.86)	-0.20 (1.11)	0.1 (2.05)
Loss	0.07 (0.80)	0.07 (0.06)	0.06 (1.02)

Table 2. *Descriptive Statistics Results of the Dutch stock market*

5.2. Modeling Results

Before conducting time series test, the stationary of the data needs to be tested. I use Augmented Dickey-Fuller test to perform this test. The ADF *t*-statistic shows -26.7, lower than the critical value of 1% (-2.67) and suggesting that the data is stationary.

Next, I use the regression model in order to find out whether the day of the week effect or holiday effect exists on the Dutch stock market during the period of observation. The inclusion of these dummies aims to control those effects and let other effects that are not captured in the model stays in the residual. The results are presented as follow (*t*-statistics are given in parentheses)

$$R_t = 0.046 - 0.011R_{t-1} - 0.034D_{Mon} + 0.017D_{Tue} - 0.011D_{wed} - 0.032\ D_{Thurs}$$

(1.11) (-0.92) (-0.58) (0.29) (-0.19) (0.55)

$$+ 0.36\ H_{holMon} + 0.007\ H_{holTue} + 0.08\ H_{holWed} + 0.515\ H_{holThurs} + 0.570\ H_{holFri}^{**} + \varepsilon_t$$

(1.03) (0.04) (0.21) (1.20) (2.32)

R^2 0.001 *Durbin-Watson: 2* *F-stat: 0.99 (Prob 0.44)*

Figure 1. *OLS regression results*

** significant at 1%, ** significant at 5%*

The coefficient for the day after non-weekend (Thursday) holiday (holFri) is significant. All other coefficients are not statistically different from zero. The Durbin-Watson statistics is 2, indicating that there is no serial correlation in the residual. Further, Breusch-Godfrey test also shows the value 1.4 indicating that there is no serial correlation in the residual. However, when White test is performed in order to detect the possibility of heteroskedasticity in the model, the Obs*R-Squared showed a value that is greater than the critical *t*-value, indicating a heteroskedasticity in the model. Hence, GARCH (1,1) process is needed in order to normalized the volatility over the years.

The GARCH model results are presented as follows (*z*-statistics are given in parentheses)

$$R_t^0 = 0.079^{*} + 0.001R_{t-1} - 0.011D_{\text{Mon}} - 0.011D_{\text{Tue}} - 0.008D_{\text{wed}} + 0.01\ D_{\text{Thurs}}$$

(2.87) (0.101) (-0.32) (-0.29) (-0.207) (0.28)

$$+ 0.616\ H_{\text{holMon}}{}^{*} + 0.101\ H_{\text{holTue}} + 0.276\ H_{\text{holwed}} + 0.275\ H_{\text{holThurs}} + 0{,}430\ H_{\text{holFri}}{}^{*} + \check{\varepsilon}_t$$

(2.95) (0.806) (1.25) (1.07) (2.68)

Figure 2a. *GARCH model results*

** significant at 1%, ** significant at 5%,*

Variance Equation

C= 0.02	*ARCH(1) = 0.11*	*GARCH (1) = 0.87*
R^2: 0.043	*Durbin-Watson: 2*	*F-stat: 0.53 (Prob 0.90)*

Figure 2b. *Variance equation of GARCH model*

The results show that the variable of holMon and holFri are significant at 1%. Before continuing to obtain the residual from this GARCH process, we must first diagnose whether these results satisfy the requirements of the good GARCH model.

1. Estimated coefficient parameter should be positive.
   Both ARCH and GARCH coefficients are positive. The coefficient of ARCH (1) is 0.11 and GARCH (1) is 0.87
2. The sum of coefficient ARCH and GARCH is less than 1 ($\alpha + \beta < 1$)
   The sum of the coefficient shows a value of 0.98 which is less than 1, indicating that the model is stationary.
3. No ARCH-Effect
   According to ARCH-LM test, p-value from Obs*R-squared shows the value that is higher than $\alpha = 5\%$.

Referring to the GARCH goodness test, three conditions of using GARCH above has been fulfilled. Now, I am going to obtain the residual from this model in an attempt to examine the soccer results effect on the Dutch stock market. The results can be seen below.

$$\check{\varepsilon}_t = -0.04 - 0.02W + 0.03L$$

$$(-2.28) \quad (-0.17) \quad (0.19)$$

Figure 3. *Residual Regression*

** significant at 1%, ** significant at 5%,*

The coefficient for the Win dummy is 0.02 while the Loss dummy is 0.03. However, both dummies are not significantly different from zero, indicating that the football results do not significantly affecting the Dutch stock returns. Thus, we accept the null hypothesis in which the Dutch stock market is unaffected by the football results. Further, this finding also embeds the view that investors are efficient and the economic benefits of football results are too small to influence the Dutch stock market index.

5.3. Statistical Robustness Check

This section examines the robustness of the efficiency of the Dutch stock market by eliminating the effects of outliers in the data. This motivated by the work of Kamstra et al (2000) in which Pinegar (2002) shows that their work is sensitive to outliers in the data. I will be using the normalized residuals to check the robustness of the model and trim 10 extreme positive and 10 extreme observations in the days following matches. After trimming the data, I still do not find a significant influence of football matches results (either wins or losses) on the Dutch stock market. Consistent with my analysis in the previous section, these robust estimates support the efficiency of the Dutch stock market.

5.4. Re-Examining the Results of (Ashton, Gerrard, & Hudson, 2003)

In this section, I will try to examine the known result by Ashton et al. (2003) with longer period of observation and different econometrical approach. Ashton et al., (2003) study the economic impact of England national football success on London Stock Exchange. They gather the data of British FTSE100 Index and all football results from 6 January 1984 to 3 July 2002 and regress the data with Generalized Methods of Moments (GMM). In their study, they found that good (bad) performance by the national team is followed by good (bad) market returns. Several years later, however, Klein et al (2008) found the statistical error in Ashton et al study and their corrected findings are the mean returns after the losses is less negative and the mean returns after the wins is less positive.

In this study, I gather data from British FTSE100 Index from 1 January 1987 to 20 July 2010. The football results are from both FIFA World Cup (starts from the qualification in 1988 for the World Cup 1990 to the last World Cup in 2010) and UEFA Euro Cup (starts from the qualification in 1987 for Euro 1988 to the latest Euro in July 2006) that are available at the official websites and Wikipedia. In total, there are 5948 observations for this study; with the exclusion of some days when there are no trading days and returns is zero.

Instead of using GMM, however, I will use the same methodology as described above; slightly longer period of observations with the inclusion of only major football events. This attempt aims to re-examine whether the national team success does affect the London Stock Exchange and to find out whether the econometrical approach that I use above is good enough to capture the possible effects on two different places of observation.

The descriptive statistics show that on the major football events during the period of study, the England national team have 72 wins and 26 losses with the average of +0.23% on a day following a win and -0.02% on a day following a loss. From this statistics results, we can see that winning a match does give an effect to the British stock market

compared to the Dutch one. Another thing that we can see from this study is not align with Edmans et.al (2003) as more important games do not lead to higher loss.

Below is the detail of the average returns one day following a match. The main events include the UEFA Euro Cup matches and FIFA World Cup matches. Qualifications refer to the preliminary matches that are held prior the events period. The standard deviations are given in parentheses.

	Mean ***(in percentage)***		
	Overall	**Main Events**	**Qualifications**
No Matches	0.02 (1.02)	N/A	N/A
Win	0.23 (1.64)	0.11 (1.26)	0.34 (1.81)
Loss	-0.02 (1.63)	0.13 (1.5)	-0.11 (1.26)

Table 3. *Descriptive Statistics Results of the British FTSE100*

Further, to assess the relationship between England national team successes on London Stock Exchange, the same econometrical steps are taken. We are going to use the same model in Equation 1. Based on the Best Linear Unbiased Estimator (BLUE) tests, however, OLS results suffer from heteroskedasticity that may be caused by the period of observations that fall during the high volatility period. Hence, I will use GARCH (1,1) as described above and the results are below.

$$R_t^0 = 0.089^{*} + 0.013R_{t-1} - 0.092D_{\text{Mon}}^{**} - 0.04D_{\text{Tue}} - 0.02D_{\text{wed}} - 0.04\ D_{\text{Thurs}}$$

(3.94) (0.94) (-2.86) (-1.19) (-0.78) (-1.43)

$$+ 0.54\ H_{\text{holMon}}^{**} - 0.017\ H_{\text{holTue}} + 0.285\ H_{\text{holwed}}^{***} - 0.127\ H_{\text{holThurs}} - 0.015\ H_{\text{holFri}}^{*} + \check{\varepsilon}_t$$

(1.98) (-0.22) (1.87) (0.55) (-0.06)

c = 0.016 ARCH: 0.09 GARCH: 0.89

Figure 4. *GARCH model results*

** significant at 1%, ** significant at 5%,*

This model fulfills all the three conditions described in the previous section. Thus, I can continue to examine the results of this model.

Referring to the results above, we can see that London Stock Exchange is less efficient than the Dutch stock market. We can observe several effects that occur here, namely Monday Effect and Holiday effect. The returns on Monday are the lowest within a week, and it is significant at 5% level of confidence. Other effects that we observe from the results are the holiday effect, in which the returns of the day following a non-weekend holiday on Monday, Wednesday and Friday is significant. Like many other countries where this effect persists, the inability of investors to react to the bad news that is likely to happen over the weekend makes the returns on Monday the lowest of the week.

By regressing the residual, we can check whether the outcome of the major football events affecting the London Stock Exchange.

$$\check{\varepsilon}_t = -0.028 + 0.24W^{***} - 0.022L$$

(-1.91) (1.76) (-0.09)

Figure 5. *Residual Regression*

** significant at 1% ** significant at 5%*** significant at 10%*

From the residual regressions above, it reveals that the London Stock Exchange is affected by the wins of the England national team success significantly. Although loss contributes to the negative returns, it is not significantly affecting the returns. This finding does not support what Ashton et.al found in which the good (bad) performances by the national team are followed by good (bad) market returns, as it is merely the wins that affect the returns. Regarding the model, I can conclude that the model used in the analysis is robust in order to capture the effects that occur in the stock market.

5.5. Possible Explanations of the Efficiency of the Dutch stock market

Despite being the most popular sports in both England and the Netherlands, football in the Netherlands do not significantly affect its stock market as it is expected. This leaves us a question: Why is there such a difference between the two countries? Hence in this section, I will try to discuss the possible causes of the no relationship between football results and the Dutch stock returns.

1. **The proportion of foreign investors is higher than domestic investors, making the football national team success is insignificant.**

   Faruquee et al. (2004) that based their study on the Coordinated Portfolio Investment Survey (CPIS) from International Monetary Fund (IMF) finds quite significant percentage of European portfolio abroad. Many of the Europeans invest one-third of their portfolio in foreign countries, particularly in the U.S market. The (domestic) investors of Netherlands show the highest share of equity portfolio held in foreign markets, with a percentage of as high as 62.8% of their total portfolio investments. From these statistics, we can roughly conclude that investors' structure is the possible explanation of the normal returns despite the predicted mood swings that may likely to occur after losses; more importantly after considering the popularity of football for the Dutch.

2. **Despite its popularity, the current football industry in the Netherlands is not yet as big as the English Premier League in terms of economic revenue to give a significant impact to the stock market.**

I observe that wins in the England national football team is followed by higher stock returns. This may partly because Premier League is the biggest league in the world with more than (£1.5 billion) in revenue, the highest of any leagues in Europe. Football in England has indeed become a commodity in which football clubs sell their stocks in the stock market or possessing its own broadcasting media (e.g.Liverpool TV). In terms of supporters, the fans of the big four English football clubs (Manchester United, Arsenal, Liverpool and Chelsea) are spread all over the world. Thus, regardless of the proportion of domestic and foreign investors in British FTSE100, the effects of the national team success in major football events will be higher as fans of English football are wide spread all over the world.

Chapter 6
Conclusion

This study finds that football results do not give a significant impact on the Dutch stock market. This finding does not support what Edmans (2007) find in which losses in football matches lead to a significant negative return on the day following the match. This paper also monitors and tests other effects, namely the day of the week effect and holiday effect, in which only holiday effect is found in the Dutch stock market.

In comparison with Ashton (2003), the success of England national team does significantly lead to a positive value of 0.23% on a day after the game while there is no significant effect found after losses. Besides that, this paper observes that there is Monday effect and holiday effect present in the British FTSE100.

From these findings, we can imply that the Dutch stock market is more efficient than the British stock market. This may causes by the difference in investor's structure of the Dutch stock market, in which it consists of more foreign than domestic investors. Another possibility, with respect to the revenue of England's football industry, is that the Dutch football industry is not as big as England's in order to give significant impact to its stock market. However, futher research is needed to prove these assumptions....

6.1. Suggestions for future research

Observing stock price movement in order to predict the pattern of stock price can be tricky. By knowing the pattern of the stock price, we can gain profits from the abnormal return. Thus, it is suggested that future researches could use longer time horizon and include more variables into the model. The research could also examines the impact of football results on the AMX as well AScX, thus a better better description of the presence of sports related anomaly on the Dutch stock market can be detected according to the size of the market capitalization. Alternatively, future researches may try to seek the causes of the efficiency (inefficiency) of the Dutch stock market related to the sports results.

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Appendices

Appendix 1: Main Regression Results

$$Model: R_t = \gamma_0 + \gamma_{1i} R_{t-1} + \sum_{i=1}^{4} \gamma_{2i} D_t + \sum_{i=1}^{5} \gamma_{3i} H_t + \varepsilon t$$

	OLS *(in percentage)*		**GARCH** *(in percentage)*	
	The Netherlands	**England**	**The Netherlands**	**England**
c	0.04	0.06	0.07*	0.08*
Rt-1	-0.011	-0.004	0.001	-0.013
Mon	0.003	-0.08	-0.011	-0.09**
Tue	-0.017	-0.29	-0.008	-0.04
wed	-0.011	-0.06	0.01	-0.02
Thurs	-0.032	-0.04	0.616	-0.04
HolMon	0.367	0.927	0.101*	0.54**
HolTue	0.007	-0.019	0.277	-0.017
Holwed	0.086	0.195	0.275	0.28***
HolThurs	0.515	-0.324	0.429	-0.127
HolFri	0.570	0.128	0.001*	-0.015*

Table 4: Summary of Main Regression results of football matches to the Dutch stock returns

** significant at 1%, ** significant at 5%,*** significant at 10%*

Appendix 2: Normalized Residual Regression Results

$$\widehat{\varepsilon t} \;=\; \beta_0 + \beta_w W_t + \beta_l L_t$$

	Mean *(in percentage)*		**Standard Deviation** *(in percentage)*	
	The Netherlands	**England**	**The Netherlands**	**England**
c	-0.041	0.028	1.40	1.02
Win	-0.021	0.237*	1.86	1.64
Loss	0.037	-0.022	0.80	1.64

** significant at 1%, ** significant at 5%,*** significant at 10%*

Endnotes

[1] Merriam-Webster dictionary
[2] http://www.prnewswire.com/news-releases/ing-studies-correlation-between-the-fifa-world-cup-and-the-economy-94813529.html
[3] http://www.nisnews.nl/public/030107_2.htm
[4] http://hubpages.com/hub/Brazil-at-the-FIFA-World-Cup-2010
[5] http://www.scribd.com/doc/30930175/Fama-French-1991-JF
[6] http://www.ifa.com/Media/Images/PDF%20files/DimsonMarket.pdf