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Financial Economics

Examining the Impact of Football Tournaments on Equity Markets:

An Analysis of Market Anomalies, Market Dynamics and Investor sentiment

Bachelor Thesis in Business and Economics 15 hp

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Abstract

This paper investigates whether two international football tournaments have an effect on the performance of four major stock markets during the event period. Some previous literature suggest that the NYSE index tended to fall during every World Cup between 1950 and 2007 due to negative investor sentiment associated with losing and being knocked out of the tournament. This enabled opportunistic investors to come up with trading strategies that exploited this "World cup anomaly" to earn excess returns. The aim is to see if investors still are able to exploit this market decline or if market actors have taken notice and arbitraged away this sentiment effect, by including more time periods in their original model.

We find evidence that the Football loss effect is only prominent and exploitable on the NYSE and the SPX markets during the World Cup. Furthermore we find that the negative effect has become smaller and less significant on a statistical level. This implies that investors have started to exploit the football loss effect since it was discovered and therefore have reduced its returns, although the trading strategy still is profitable.

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1. **Introduction**

This section starts off with introducing the reader to the topic and the background. Then a problem description informs the reader of the conflicting information regarding the topic, which is followed up with a section that describes the purpose of the paper.

1.1 Background

There is no doubt that international football tournaments such as the FIFA World Cup or the UEFA Euro generate a lot of interest and attention. Every time a major tournament is played, millions of football fans travel to the hosting country while many more support them from home, sparking a football mania. A football tournament is generally divided into two stages. First the group stage, where national teams compete in groups of four and the top two teams advance to the knockout stages. The knockout stages consist of elimination games where the two teams last standing plays the final. The winner of the final wins the tournament. Almost one and a half billion people watched the FIFA World cup final between Argentina and France in 2022 alone (FIFA, 2022). As football fans long for the prestigious first place in the tournament the outcomes of the games might heavily affect their emotional states. The Argentinian team ended up winning the dramatic final, sparking boundless joy as hundreds of thousands flooded the streets of Buenos Aires to celebrate the achievement. However, having these heavily emotional stakes involved also might have its drawbacks. According to a study the increased emotional stress during World Cup matches causes the number of heart attacks to skyrocket (Wilbert-Lampen, 2008).

The field of cognitive sciences has made significant advancements in the last fifty years. Among many things, this field of psychology aims to explain how emotions and thinking processes affect people's behavior and decisions, making it valuable for analyzing the behaviors of investors. As a result, the field of behavioral finance has emerged which studies the psychology and behaviors of financial markets. As a lot of investors also might be football fans subject to the emotional roller coaster of tournament games, it makes it interesting to see if their feelings of optimism after a win or pessimism after a loss, has any spillover effect to the financial markets which potentially could be exploited.

Some studies indicate that there could be a football spillover effect on financial markets. Edman et al. (2007) examined if there is a link between stock returns and investor sentiment

caused by football games. By looking at stock returns after World Cup games were played in 39 stock markets, they found that losses had a significant negative effect whereas a win had no significant effect on the domestic market. They suggested that this asymmetry was explained by changes in investor mood, with the key finding that pessimism caused by losses would spillover to the markets while optimism aroused from wins would not (Edman et al, 2007). This phenomenon will furthermore be referred to as the "Football loss effect" in this paper. The Football loss effect should not be confused with the behavioral finance term "Loss effect", established by Kahneman and Tverky (1992). The Football loss effect simply illustrates that a country's stock market tends to go down if their national football team loses a game in a tournament game, as a result of pessimistic investor mood (Edman et al, 2007).

In 2008, Kaplanski and Levy aimed to develop a risk free trading strategy to exploit the football loss effect on the FIFA World Cup (Notation, further on in this paper K&L will be referred to as K&L, 2008). As only one of the 32 countries participating in the tournament ends up as the winner, it implies that there are 31 losing countries. Their main idea was that negative investor sentiment in local markets would spillover to bigger international markets such as the US markets. As the football loss effect would take effect in all the 31 countries and subsequently spill over to the US markets, they argued that the NY composite Index would be expected to fall during every World cup period. By shorting or exiting the US market during this period, investors could exploit the football loss effect and make "free lunches".

K&L found that the average return on the NYSE index during the World Cup period was -2,58% compared to +1,21% for all days over the same period, which was statistically significant. They also found that investors could exploit the football loss effect for abnormal profits. It turns out that the outcomes of games in football tournaments might have an effect on financial markets.

1.2 Problem description

The outcome of a game in the World Cup should logically not have an effect on financial markets as a whole, since it neither affects the expected future cash flows for companies and their stock price. The exception would be the stocks of companies that are related to the World Cup in some way, such as sport retailers, sponsors and betting companies. If outcomes in the World Cup have an effect on the financial markets it implies that markets are not fully

efficient as asset prices are not perfectly priced. This would contradict the efficient market hypothesis.

Research proposes that there are a couple of market anomalies such as momentum (Jegadeesh, Titman, 1993) and size (Banz, 1981) which goes against the efficient market hypothesis. A market anomaly is a temporary distortion that deviates from the expected return of the market, and is often caused by overreactions and investor mood. Opportunistic investors can exploit these distortions to earn higher returns. In line with the research previously mentioned, it could indicate that the FIFA World Cup is a market anomaly.

As this research was done over 15 years ago it undeniably poses the question if this still holds true. Actors on the market might have fully recognized the anomaly and intensified the decline by short selling stocks before the World Cup at a higher level. It is also possible that anomaly has been arbitraged to the point that it has disappeared. Overall, it is interesting to follow up on the paper made by K&L, to see if opportunistic investors still might be able to exploit the World Cup anomaly and make excess profits.

It might also be interesting to see if the football loss effect causes exploitable anomalies during other international football tournaments such as the UEFA Euro cup, which is the continental championship in Europe. This to see if UEFA Euros affect the US markets as well. The UEFA Euros is a relevant tournament to extend the research due to the large European investment in the US. According to Statista, European investment has rapidly increased during the past 20 years and more than doubled between 2010 and 2021 (2021).

Table 1.3.1 European FDI investments into the US (USD in billions)

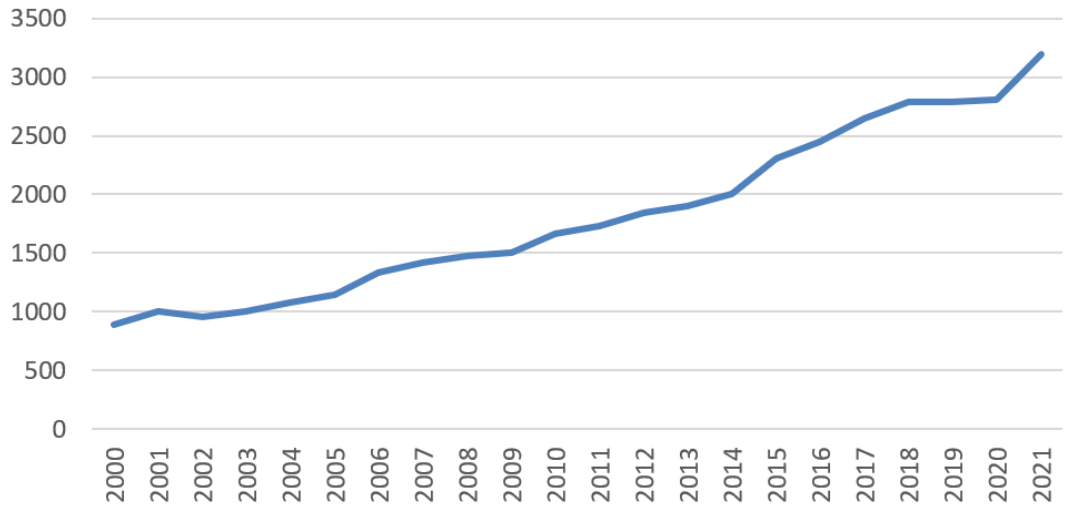

Table 1.3.1 represents a graph of the increase in Foreign Direct Investment from European countries into the United States during 2000 to 2021. The data is gathered from Statista.

1.3 Purpose

The purpose of this paper is to update the work done by K&L, through testing their model against the New York composite index (referred to as NYSE) in a larger sample size which includes four additional World Cups. This to determine if investors still can exploit the World Cup anomaly to make excess profits. In addition, this paper aims to extend their findings by testing the same model towards another prominent US index which is the S&P 500 (referred to as SPX). Furthermore, this thesis will investigate if the football loss effect can be exploited on these indexes during the UEFA Euro championship. As only European countries participate in this tournament, two of the major European stock indexes are included to see if the football loss effect is spilled over to these markets as well. The indexes included are the British Financial Times Stock Exchange 100 (referred to as FTSE) and the German Deutsche Aktienindex (referred to as DAX). Although the proportion of international assets held there is smaller compared to the US, one could find it reasonable that the football loss effect would spill over to these markets as well. Therefore the markets will be examined to see if they also are impacted negatively during the World Cup period and UEFA Euro period. In addition football has a big cultural impact on many European countries. For example a survey done by Hudson found out that 62% of women and 70% of men in England believed that their working lives would be impacted by the 2006 World Cup (Hudson, 2006).

2. **Theoretical framework**

In this section, the reader is introduced to the theoretical concepts which are relevant for understanding the topic as well as for the discussion and drawing conclusions. First, the efficient market hypothesis will be presented followed by market anomalies, investor attention, investor sentiment, overreactions and the football loss effect.

2.1 Efficient market hypothesis

The Efficient Market Hypothesis (EMH) is an established financial theory that states that financial markets are efficient and that asset prices reflect all available information at any given time. This means that stocks are always bought and sold at their fair value, given the expected future cash flows they give rise to. If new information is released that changes these expectations, investors will immediately buy or sell the stock to a level that reflects its new fair value. A key assumption of this theory is that all market actors are expected to be fully rational when investing, meaning that all have full information about all the assets and make optimal decisions. If this holds true, it will be impossible for investors to outperform the market as the mechanics described above always will keep assets perfectly priced. This means that investors will be unable to earn excess returns through arbitrage opportunities, as they cannot exist under these conditions. When assets are perfectly priced, investors instead need to add risk to earn higher returns (Fama ,1970).

The EMH requires three conditions to be met for the theory to hold. The markets are assumed to be free from transaction costs, all information is always publicly available for investors, and lastly, the market can form consensus regarding what the fair value of the asset price should be. Although some actors might disagree on the current opinion of an asset's fair value, it is sufficient if a majority believes it is. If these criteria hold, the market is efficient (Fama 1970, p378, 388).

Furthermore Fama, the developer of the EMH, argued that market efficiency can vary between different markets, and is therefore categorized into three different levels – strong, semi strong, and weak market efficiency. Strong market efficiency refers to the fully efficient market described earlier where asset prices reflect all available. The market efficiency is semi-strong when all information is publicly available but there is a timely lag for information to be reflected into prices. In contrast to the strong market efficiency, it is

possible for investors to outperform the market under semi-strong efficiency. The weak form of market efficiency occurs when the only information reflected in the stock prices is historical ones (Fama, 1970, p388).

Ever since EMH was developed it has been recited in many publications and widely used to teach students about the fundamentals of financial markets and asset pricing. On the other hand, its assumptions have been questioned, especially that all market actors are rational and take all available information into account when buying or selling shares. According to Lo, this assumption is unrealistic since studies show that investors are influenced by emotions and other factors when making investment decisions. Furthermore, some investors might be more inclined to favor survival over profit maximization by focusing on limiting the downside risk in their portfolios rather than maximizing the return given an assured point of risk (Lo, 2004)

2.1.1 The relationship between the efficient market hypothesis and this study

The efficient market hypothesis is one of the key foundations in finance and financial research, as it provides a framework to understand the fundamentals of the market, and is closely linked to other financial theories and other financial studies. This study is no exception since it aims to explore whether one might take advantage of investors' irrationality during international football tournaments. EMH is also closely linked and contrasted against other theories which are included in this section. More specifically, the assumption that market participants are rational and that markets are efficient is of high importance. If the results show that the market goes down when football tournaments are played, it implies that irrational investors could make the market inefficient during these periods which in turn can be exploited to earn higher returns. Such results would raise the probability that a Football anomaly exists. If no significant results are to be found, it is possible that the markets investigated are efficient during the event periods.

2.2 Market anomalies

The behavioral finance theory emerged when De Bondt and Thaler published a study suggesting that stock markets are inefficient during times where investors' feelings of pride, fear, doubt and hope influence their investing behaviors. This sentiment leads investors to distort asset prices above or below their fair values (1985). According to Silver, market anomalies are occurrences that go against and deviate from the assumptions of EMH. In

addition, EMH fails to answer why they happen (2011). In other words they should not happen. According to Kahneman and Tversky, anomalies can be seen as indicators of inefficient markets (1986). They often appear as a consequence of market actors behaving irrationally, and can be driven by momentum (high expectations and belief from the market) or seasonal effects (Nurdina et.al, 2021). These market distortions might present arbitrage opportunities. As investors identify and act on these opportunities the market and the asset prices are adjusted eventually, restoring market efficiency. Some market anomalies occur once and then disappear (such as large financial crashes) while others persist over time. Seasonal or calendar anomalies tend to be systematic and recurring during different periods, which anticipating investors possibly can exploit (Schwert, 2003). The monday effect illustrates that stocks tend to perform better or worse during specific days of the week. Smirlock and Starks found that the closing price on stocks on average tended to be significantly lower on mondays compared to fridays (1986). The January effect shows the tendency for small stocks to perform well on the market during the first weeks of the year. This increase is partly explained by investors selling stocks in December and buying them back in January for tax benefits, making the market more liquid in January. As a consequence, the stock market tends to overperform in January compared to the other months of the year (Haug & Hirschey, 2019).

2.2.1 The relationship between market anomalies and this study

Market anomalies can be seen as indicators of inefficient markets. As this thesis aims to determine whether some financial markets are efficient or not, it is therefore a relevant term to include. If not, it is possible that markets are efficient during football tournaments and that former “free lunches” have been arbitraged away. If it has an effect on the other hand, it is possible that the markets are inefficient during football tournaments which investors can exploit. Furthermore, a football anomaly should be seen as a calendar anomaly since it is recurring in clearly specified periods. The January- and the Monday effect will be used in the regression to control for anomalies and is therefore briefly mentioned.

2.3 Attention allocation and Investor attention

According to Kahneman (1973), attention is a scarce cognitive resource, meaning that an individual needs to put in efforts to process information when making decisions. This information-gathering process consists of a tradeoff between the timely effort it takes to gather the information needed to make the optimal decision and the utility that the decision

gives the individual. Since time is a limited resource, individuals might put more effort in when making important decisions. Thus attention allocation might be an important factor in the decision making process (Simon, 1955).

Translated to the financial markets, the attention put towards new market information varies between investors, affecting their information gathering process and decision making when buying or selling stocks. This is described as Investor attention. Financial institutions such as hedge funds may put a lot of effort and resources to base their investment decisions on sophisticated information. On the contrary, smaller investors might base their investment decision on less sophisticated information that is deemed good enough. Overall investor attention suggests that there are differences in how much time and effort investors put in when evaluating investment opportunities in the stock market. Big market actors such as hedge funds may have the ability to gather a lot of information about all market sectors while smaller actors such as individual investors may have a limited ability and mainly focus their attention towards stocks currently discussed in news and forums (Peng & Xiong, 2006).

2.3.1 The relationship between Investor attention/Attention allocation in this study

Investor attention provides an extensive perspective of investors by explaining that there are differences in knowledge, capability and effort between them. This sparks a large contrast to the image of the rational investor from EMH, who assumes that all investors are homogenous and have full information about the market activity. In this thesis, investor attention (or rather investors inattention) is included since it provides a link between the financial markets and football tournaments. Ehrmann and Jansen discovered that market trading activity plummeted and national stock markets comovement towards global stock market decreased significantly when the own country played a World cup game (2012). In other words, football tournaments could be competing with the financial markets for the attention of investors. Although the study only measured the trading activity on the national markets and not the returns, it showed that it decreased the investors attention towards the markets.

2.4 Investor sentiment and Overreactions

Investor sentiment puts emphasis on the overall opinion and feelings of the aggregated market towards individual securities or the market as a whole. As Investor Attention describes which stocks or market sectors investors currently pay attention to, Investor Sentiment describes how investors feel and think about them. This can constantly be seen in

the current market trends. If the general opinion of a market sector is positive for example, then the demand for stocks operating in that sector tends to go up as investors want to capitalize on it. Similarly, if the opinion is negative then investors tend to sell their stocks in that sector and stay away from it (Baker & Wurgler, 2007).

Market overreactions are a consequence of increased investor sentiment, and show that the stock market is not efficient at all times. Instead overaction tells us that new information such as a news announcement from a company may cause an overaction in the stock price in relation to its intricate value. The overreaction both upwards and downwards on the price of the security is believed to be caused by either fear or greed in investors. Furthermore as time moves on the price of the security is supposed to drift until it reaches its intrinsic value (Howe, J.S. 2018).

2.4.1 The relationship between Investor sentiment/Overreactions and this study

In this paper, investor sentiment and overreactions are vital for understanding why the World Cup anomaly exists and how opportunistic investors are able to exploit it. Together with investor attention, sentiment and overreactions might explain the phenomenon of the football loss effect and why it causes investors to act irrationally. As a nation is playing in the World Cup, the attention of its investors are shifted towards the game. If the country loses, the investors might be inflicted with negative investor sentiment that spills over to the markets. This may cause a short lived negative overreaction if investors sell. As the feelings from the game fade away, this reaction is eventually corrected by the market. Although there will not be any coefficients that directly measure the sentiment in the regression that will be conducted, it serves to explain the psychological and behavioral aspects that could trigger the Football loss effect.

2.5 The Football Loss Effect

The football loss effect is a term used by the authors to illustrate the key finding of Edman et al, that only losses impact the financial markets. To clarify, it means that the domestic stock markets only are affected by football games when the national team loses a game, and that the effect only is negative. If the national team draws or wins, the football game is expected to not have an impact on the domestic stock market (Edman et al, 2007). The reasons for why only losses influence the markets could be explained by loss aversion, the cognitive bias that

the pain of losing is felt stronger and impacts the wellbeing of an individual on a higher level compared to the happiness of winning (Kahneman & Tverky, 1992).

K&L believe it to be reasonable that the negative market sentiment aroused by losing would not be contained in the domestic market. If an investor would sell a small portion of their assets, they argue that a part of it also will consist of any foreign assets held. On an aggregated level they believe that the decline from the football loss effect to some extent might spill over to foreign stock markets. Therefore, they believe that investors might be able to capitalize on the football loss effect on bigger financial markets during football tournaments. This since lots of national teams participate and lose games, causing these markets to decline as foreign investors sell off assets consistently during the tournament period (2008).

2.5.1 The relationship between The Football Loss Effect and this study

The football loss effect as a term is not recognized by the scientific community, but is used by the authors in this thesis since it concisely describes and summarizes how football tournaments might influence financial markets. The authors choose to include it in the theoretical framework since it is vital for understanding and therefore needs to be clarified further. It will be discussed further in the next section.

3. **Previous research**

In this section the reader is presented with a summarization of different relevant articles and motivations to why they are relevant in this thesis.

Table 3.1 Previous research

Authors	Title	Countries or Markets the research is based on	Topic	Year
Schwarz et. al	**Soccer, rooms, and the quality of your life: Mood effects on judgments of satisfaction with life in general and with specific domains**	Germany	Analyzed how the self perceived well being among Germans were influenced if their national team won or lost a football game	1987
Schwarz	**Feelings as information: Informational and motivational functions of affective states**	United states	Discusses how the current mood might influence the decision making of individuals	1990
Schwert	**Anomalies and Market efficiency**	US stock market	Market anomalies, Examines if impact of anomalies decreases after they are discovered	2003
Edman, Garcia & Norli	**Sports Sentiment and Stock Returns**	39 countries around the world	Behavioral finance; Investor sentiment from football games and stock returns	2007

Kaplanski & Lewy	**Exploitable Predictable Irrationality: The FIFA World Cup Effect on the U.S. Stock Market**	US stock market: NY composite stock index	Behavioral finance, trading strategy; Return on the NY composite stock index during the World Cup period	2008
Ehrmann & Jansen	**The pitch rather than the pit: Investor inattention during FIFA World Cup matches**	39 stock indexes around the world from countries participating in the World Cup 2010	Investor attention and World Cup; examines if market trading activity affected if World Cup games are played during market hours	2012

Table 3.1 details the research in this paper including: article names, authors, research topic, regions the research is based on and year published.

The primary source of inspiration for the topic of the thesis is based on previous research done by Edmans et al. They wrote an article named “Sports Sentiment and Stock Returns” which is published in *The Journal of Finance* (Edman et.al, 2007). The article explores how the connection between psychological findings and football can cause sudden changes in investor mood i.e. investor sentiment. They categorized football games as mood events that could trigger changes in investor sentiment, and investigated if the outcomes of the mood events had effects on stock markets. The idea was that wins on average would inflict optimism on the market, leading to a rise in stock prices and vice versa for losses. This by examining outcomes of over a thousand football games and the stock market returns in 39 markets.

The authors conclude that football and other sport events did affect the stock market. However only losses were significant and most prominent in football compared to other sports. The negative effect from football on losses were not driven by rational investors but instead by a change in investor mood affected by pessimism. According to the authors football outcomes have little economical effect but they do affect mood. Furthermore they found that this effect was more prominent in countries where football is more important, and

especially for elimination games in tournaments. The effect was also more prominent in small stocks due to them being more exposed to changes in investor mood.

The mood argument and reasoning goes in line with research made by Schwarz in 1990. He argues that our mood affects the choices people tend to make. According to him, people make different decisions depending on their state of mind. If one is in a good mood they tend to be more optimistic when making decisions. If they on the contrary are in a bad mood they might be more pessimistic.

However this raises the questions if moods have a relationship to sports, and more specifically, football? According to another article by Schwarz (1987) there could be a connection. The argument is based on a study they made where the authors measured how good people felt in West Germany after they had won or drawn a football match. The results indicated that people felt more good when West Germany won but decreased when they drew.

Moreover, football affects markets in other aspects as well. Ehrmann and Jansen (2012) provides evidence of this in their article “The pitch rather than the pit: Investor inattention during FIFA World Cup matches”. The article was published in the ECB working paper and investigates how market trading activity fluctuated as World Cup games in South Africa were played during market trading hours. By using minute-to-minute trading data for various international stock exchanges, the aim was to determine if there was a relationship between trading volumes and match events. If so, it could indicate that the attention of investors shifted from the stock market to the football games.

Ehrman & Jahnsen found that the number of trades dropped by 45% while volumes were 55% lower when the national team played. Critical match events such as a goal caused an additional drop of 5% in trading activity. This was not to be observed as a significant reduction in the shift of attention, as this resembled a drop that usually is observed during lunch hours. The comovement between national and global stock markets decreased by over 20% during World cup matches, which was found to be significant. These findings indicate that investors follow the development on the football pitch rather than the stock market during World Cup games. Importantly, this might indicate that the World cup competes for investors’ attention.

However, all of the previous research led us towards an article written by Kaplanski and Levy (2008). Their article builds on the research from Edmans, García, and Norli (2007) who concluded that local stock market returns are affected negatively if a team from that country loses. With this information the authors wanted to test if investors could develop risk-free trading strategies that exploited this effect.

A problem with the previous study made by Edman et al. was that investors could not exploit the effect on local markets after a game since the results were already known. That means that the effect had already taken place and lowered the prices on stocks, making investors unable to exploit the effect. By shorting the stock markets of the two playing teams, an investor could in theory make profits on the losing country and neither gain nor lose on the winning country. This strategy was however unlikely to cover the transaction cost of trading in the two markets and thus, make it unprofitable.

Instead, K&L proposed that opportunistic investors seeking to exploit the football loss effect should turn to the US stock market. They argued that investors could make profits during the World Cup by either shorting the market index, or by selling positions in it to buy treasury bills during the event and buy back positions in the index after it has finished. This was the factor which sparked the authors interest to test if the effect still is valid, if the UEFA EUROS affected the stock market and if the European stock markets also was affected.

Nevertheless, the reason why the US stock market could be profitable was mainly because of three factors. Firstly, because there is an abundance of foreign trading in the US markets. Approximately a third of all trades done are done by foreign participants. In addition, many countries hold big portions of their wealth in US corporate equity (U.S. Bureau of Economic Analysis, 2007). This is argued to justify the spillover effect from local markets to US markets, meaning that negative investors who after a loss sell in the domestic market are also expected to sell in the foreign market. By only trading in the US market the transaction costs are reduced. Secondly, the football loss effect is asymmetric in nature, as only losses affect the market. This leads on to the third point, that the asymmetric effect on an aggregated level will drive the NYSE composite index down during the event period. As the World Cup produces one winner but 31 losers, the negative sentiment spilled over from the losing countries is expected to cause the market to decline during the tournament. As the aggregated effect on the US market only depends on teams losing, it essentially makes the strategy

risk-free. Since there can only be one winner, one can expect with 100% certainty that investors from the 31 losing countries will drive the market down over the period, given that all the assumptions hold.

K&L found that the average return on the NY composite stock index during the World Cup period was -2,58% compared to +1,21% for all days over the same period, which was statistically significant. To test if the World Cup period could be exploited to earn abnormal profits, they calculated the returns on investing $1 in the NY Composite Index from 1950 to 2007 from two different holding strategies. The first strategy consisted of a simple buy-and hold strategy over the whole period. Whilst the second strategy also assumed a buy and hold strategy over the period, the difference was that the index funds were sold and invested in US treasury bills during the World Cup period. The simple buy-and- hold strategy had a return of $4,386 while the exploit strategy had a return of $6,948. This almost amounts to a 50% increase (2008).

On the other hand could it be important to be critical to anomalies if research from Schwert (2003) is analyzed. Since he investigated if the effect of some anomalies had disappeared or weakened after being highlighted in academic research. This through looking at the anomalies during different time periods. In addition, he raised concerns that some observed anomalies in datasets were “more apparent than real”, meaning that the anomalies could be purely statistical and hence not carry any real impact on stock markets. Findings of statistical anomalies could appeal researchers into investigating them further, and thus exaggerating their importance when in reality they are only spurious correlations.

The anomalies included were the size effect, the value effect, the weekend effect and the dividend yield effect. Schwert found that the size effect anomalies became weaker after it was discovered and that the weekend and dividend yield effect had lost their predictive power. He argued that practitioners who created investment vehicles to exploit anomalies and anomalous behavior on the market caused them to disappear or have weaker effects on the markets.

Schwertz 'article gave the perspective that the World Cup anomaly needed to be followed up. This to see if the effect of the anomaly has decreased or if it just is a statistical anomaly.

3.1 Summary of previous studies and relevance for this study

The articles by EGN (2007) and K&L (2008) are the most crucial theoretical ground for this thesis. The key takeaway from the EGN article is the finding of the football loss effect, suggesting that there is a clear connection between football investor sentiment and the stock market. The evidence suggesting that only losses affect the markets,is one of the key assumptions for the model in the K&L article. The K&L article is crucial since this thesis is intended to extend its findings and to review if the original strategy still is profitable. As mentioned before, the main idea of the strategy is to exploit the negative overreaction on US stock markets, that is caused by negative investor sentiment associated with the football loss effect. The assumption that the sentiment causes spillover effects to the US market makes it reasonable to further assume that the same thing would happen during other tournaments. Therefore it is reasonable to use the same model approach to check if the strategy can be exploited during the UEFA Euro and World Cup as well.

The two articles written by Schwarz et. al provides an extensive explanation to how emotions affect an individual's decision making (1990) and how football wins and losses can affect the wellbeing i.e. the sentiment of people in a country (1987). The EJ article (2012) shows evidence that national market trading activity falls due to investor inattention during the World Cup. This finding suggests that the event has a clear effect on the markets and could imply that the market could become less efficient during the World Cup as large portions of the aggregated attention is shifted towards the tournament.

The last article written by Schwert (2002) shows that the impact of anomalies tend to be reduced or disappear after being discovered, as investors start to arbitrage it. This could imply that the proposed World cup anomaly might have weakened or disappeared after the KL article was published. The concern that some market anomalies in reality could be statistical anomalies is also interesting. If the regression robustness checks do not hold it could imply that the World cup anomaly is purely a statistical anomaly, disregarding it completely. Overall, Schwert’s article is highly relevant for the results and discussion in this paper.

4. **Method**

In this section the reader will receive an introduction of the general idea of the model, the null hypotheses and our expectations of the hypotheses. Thereafter the regression and how it is constructed is presented to the reader, with also including a description of each variable. Then the paper goes over the data which is used and its relevance. Lastly, the reader is informed how the regression will work and be analyzed and alternative methods.

The choice of method which will be used to reach a conclusion for our thesis will be quantitative. Therefore a linear regression in the form of an OLS regression will be made to see if there is a relationship between the matches and the return of the SPX and NYSE Composite Index as a benchmark for the US stock market and DAX and FTSE 100 indexes for the European stock market. The football matches will be independent variables and the main variable of interest. Whilst the daily return of the indexes will be the dependent variables. By constructing the regression in this way the paper will be able to conclude if there is a relationship between football tournaments and the stock markets.

4.1 Hypotheses

Due to the testing of World Cup matches and UEFA Euro matches on several indexes there are 8 null hypotheses.

H_{01} = There is not a relationship between the return of the SPX and World Cup matches
H_{a1} = There is a relationship between the return of the SPX and World Cup matches

H_{02} = There is not a relationship between the return of the SPX and UEFA EURO matches
H_{a2} = There is a relationship between the return of the SPX and UEFA EURO matches

H_{03} = There is not a relationship between the return of the NYSE and World cup matches
H_{a3} = There is a relationship between the return of the NYSE and World cup matches

H_{04} = There is not a relationship between the return of the NYSE and UEFA EURO matches
H_{a4} = There is a relationship between the return of the NYSE and UEFA EURO matches

H_{05} = There is not a relationship between the return of the DAX and World cup matches

H_{a2}= There is a relationship between the return of the DAX and World cup matches

H_{06} = There is not a relationship between the return of the DAX and UEFA EURO matches
H_{a6} = There is a relationship between the return of the DAX and UEFA EURO matches

H_{07} = There is not a relationship between the return of the FTSE and World cup matches
H_{a7} = There is a relationship between the return of the FTSE and World cup matches

H_{08} = There is not a relationship between the return of the FTSE and UEFA EURO matches
H_{a8} = There is a relationship between the return of the FTSE and UEFA EURO matches

4.1.2 Expected results from the hypotheses

To begin with it is important to note that our data differ from K&L's article since our study period is between 1950-2022 and our analysis includes the SPX whilst K&L's study period was between 1950-2007. In addition this paper differs since it includes the cups during 2010-2022 (4 World Cups) compared to K&L. However, as the regressions are made for the World Cup we expect similar results to their study. But the effects of the World cup could possibly be more limited or even nonexistent if market actors have conducted investment vehicles aiming to exploit the effect since the anomaly has become known.

Furthermore there is an expectation that the UEFA Euro cofficents will be negative and significant. Support for this can be found in a report from the U.S. Bureau of Economic Analysis, (2007) since a large amount of European investment is invested into US stock and corporate bonds. On the other hand, the UEFA Euro event days sample might be too small since it is approximately 44% smaller than the World cup sample. Thus the sample could be too small to achieve a significant coefficient.

4.2 Modell specifikation

The OLS regressions are adopted on previous research from K&L (2008) and is constructed as:

(1)

$$R_{tNYSEE} = \beta_0 + \beta_1 R_{t-1} + \beta_2 R_{t-2} + \beta_3 D_m + \beta_4 D_T + \beta_5 D_w + \beta_6 D_{th} + \beta_7 T_t + \beta_8 P_t +$$

$$\beta_9 E_{tEM} + \beta_{10} E_{tWC} + \beta_{11} H_t + \beta_{12} L_t + \varepsilon$$

(2)

$$R_{tNYSEV} = \beta_0 + \beta_1 R_{t-1} + \beta_2 R_{t-2} + \beta_3 D_m + \beta_4 D_T + \beta_5 D_w + \beta_6 D_{th} + \beta_7 T_t + \beta_8 P_t +$$

$$\beta_9 E_{tEM} + \beta_{10} E_{tWC} + \beta_{11} H_t + \beta_{12} L_t + \varepsilon$$

(3)

$$R_{tSPX} = \beta_0 + \beta_1 R_{t-1} + \beta_2 R_{t-2} + \beta_3 D_m + \beta_4 D_T + \beta_5 D_w + \beta_6 D_{th} + \beta_7 T_t + \beta_8 P_t +$$

$$\beta_9 E_{tEM} + \beta_{10} E_{tWC} + \beta_{11} H_t + \beta_{12} L_t + \varepsilon$$

(4)

$$R_{tDAX} = \beta_0 + \beta_1 R_{t-1} + \beta_2 R_{t-2} + \beta_3 D_m + \beta_4 D_T + \beta_5 D_w + \beta_6 D_{th} + \beta_7 T_t + \beta_8 P_t +$$

$$\beta_9 E_{tEM} + \beta_{10} E_{tWC} + \beta_{11} H_t + \beta_{12} L_t + \varepsilon$$

(5)

$$R_{tFTSE} = \beta_0 + \beta_1 R_{t-1} + \beta_2 R_{t-2} + \beta_3 D_m + \beta_4 D_T + \beta_5 D_w + \beta_6 D_{th} + \beta_7 T_t + \beta_8 P_t +$$

$$\beta_9 E_{tEM} + \beta_{10} E_{tWC} + \beta_{11} H_t + \beta_{12} L_t + \varepsilon$$

4.2.1 Variable specification

1. R_{tNYSEE} is the daily return of the equally weighted NYSE Composite Index. The subscript NYSEE is the index used.
2. R_{tNYSEV} is the daily return of the value weighted NYSE Composite Index. The subscript NYSEV is the index used
3. R_{tSPX} is the daily return of the SPX index. The subscript SPX is the index used
4. R_{tDAX} is the daily return of the DAX index. The subscript DAX is the index used
5. R_{tFTSE} is the daily return of the FTSE 100 index. The subscript FTSEis the index used
6. Beta 0 is the intercept of the regression.
7. R_{t-1} and R_{t-2} is the return from the previous trading day and the trading day two days ago. The subscript t-1 is the previous date whilst t-2 is the date two trading days ago.

8. $D_{m,T,w,th}$ are dummy variables which control if it is a monday, thursday, wednesday or thursday. These variables are able to take the value 1 if it is the weekday or 0 if it is not the week day. The subscripts stand for, m:Monday, T:Tuesday, w: Wednesday and th: Thursday.
9. T is a dummy variable for the first five trading days of the taxation year. They take the value 1 if it is a taxation day and 0 if it is not.
10. P is a dummy variable for the event period which is june-july during all of the years. It takes the value 1 if it is July or June and 0 if it is not.
11. E_{WC} is a dummy variable for an event day which is all the trading days from when the World Cup starts to the final, plus 2 trading days after the final. If it is an event day it takes the value 1 and if not 0. The subscript WC stands for the World Cup.
12. E_{EM} is a dummy variable for an event day which is all the trading days from when the UEFA Euro Cup starts to the final, plus 2 trading days after the final. If it is an event day it takes the value 1 and if not 0. The subscript EM stands for the UEFA Euro.
13. H and L are the ten days with the highest return, respectively 10 ten days with the lowest return. They take the value 1 if it is the 10 highest or lowest, otherwise 0.

The subscript t stands for the date in all variables.

D, T, P, and H and L are control variables.

The purpose of the D dummy variable for weekdays is to be used as a control variable for the monday effect (K&L, 2008). Several equity markets have Mondays shown to have returns which are different from the mean (Chang, Pinegar, and Ravichandran, 1993).

In addition T controls for the January effect which could be caused due to tax-loss harvesting (Dyl and Maberly, 1992). D and T are control variables which are used to conclude if the World Cup and UEFA Euro effect is driven by itself or if it could be due the effect of the January or Monday effect.

Moreover, P_t is in place to control if the possible effects from the World Cup and UEFA Euro matches are driven by the tournaments or if it is due to the June-July effect. And H and L are in place to conclude that none of the most volatile days contaminate the regression (K&L, 2008). Moreover, the purpose of R_{t-1} and R_{t-2} are to handle the first order serial correlation since the regression is based on time series data (Edmans, García, and Norli, 2007).

4.3 Data

The data which is used in the regression is sampled from several different databases. To begin with, the indexes which have been chosen are broad market indexes which have been exciting for a long time. This is because this paper wants to see if the World Cup and the UEFA Euros affects the equity markets as a whole. In addition, to be able to analyze the markets, a larger sample of observations is preferable since it better portrays the population (Andrade, 2020).

The daily SPX, DAX and FTSE 100 returns are gathered from Capital IQ, event days are gathered from FIFA's official website and UEFA's official website and the NYSE Composite returns are gathered from CRSP provided by WRDS. The daily return for NYSE indexes and SPX consists of 18456 observations each which span between the 3rd of january 1950 to the 30th of December 2022. The event days amount to 224 trading days for the UEFA Euro and 394 trading days for the World Cup. Furthermore, the DAX index consists of 8966 observations and spans between the 7th of July 1988 to the 28th of April 2023. The FTSE index consists of 9739 observations and spans between the 2nd of January 1985 to the 28th of April 2023.

The reason why the observations differ quite drastically between the US and the European stock indices is because the modern version of the DAX index was constructed in 1988 (Börse Frankfurt, 2021) and the modern version of the FTSE 100 index was constructed in 1984 (London Stock Exchange, 2023).

Table 4.3.1

Variable	Obs	Mean	Std. Dev.	Min	Max
SPX	18456	.0003392	.0098846	-.2046693	.1158085
NYSEE	18456	.0005627	.0091816	-.150043	.1344604
NYSEV	18456	.000454	.0094288	-.1835058	.1152698
DAX	8966	.0003855	.013852	-.1281067	.1140195
FTSE	9739	.0002515	.0109406	-.1221556	.0983877

Table 4.2.1 details descriptive statistics of the dependent variables, this includes number of observations, mean, standard deviation, minimum value and maximum value

In addition, the base for the dataset is the dependent variables (the indexes) which are computed in excel. From there all of the independent variables have been added manually in relation to the date of the trading days. Thereafter the dataset was exported into Stata to be processed for the OLS regressions.

4.4 The OLS regressions

Several OLS regression will be done to analyze if the tournaments have a significant effect on the US and European stock markets. The reason for several regressions is due to the fact that there are 5 dependent variables. When the regressions are run the model will show if there is a linear relationship between each dependent i.e the daily return in percent of an index and the independent variables on a significant level of 1% and 5%. If the variables of interest, i.e the indexes are significant there could possibly be a relationship. However this needs to be analyzed with relation to the other independent variables to see if they could affect the results. Furthermore, the slopes of the coefficients also need to be analyzed to determine if the effects are economically significant.

It is important to remember that there are several ways research can be made on the UEFA EURO and the World Cup in relation to the equity markets. For example, more variables of interest could be included such as volatility, volume or daily returns exceeding “xx” percent or dependent variables in form of more niche indexes such as industries or size. However, this paper has limited itself to do research on only daily price return and sees the other suggestions as topics for further research.

In addition, all of the regressions will also have robust standard errors by adding the code “vce(robust)” in Stata. The reasoning for this is because there is a high possibility of heteroscedasticity with financial time series data. By using robust standard errors an attempt is made to reduce the heteroscedasticity (Mansournia et al., 2020). The authors chose this alternative instead of implementing a GARCH regression, since K&L implemented a GARCH correction in their paper but saw no significant changes compared to the OLS regression (2008).

4.5 OLS Assumptions

In this section several tests will be presented which later will be used to test the data to see if the regressions follow OLS assumptions.

4.5.1 Heteroscedasticity

Heteroscedastiy is a phenomenon that occurs when the sample or population which is used does not have constant variance. The consequences of heteroscedasticity can lead to unreliable coefficients for the independent variables and faulty standard errors. Therefore the Breusch Pagan test is a chi-squared test which seeks to uncover if variables in a dataset are heteroscedastic or homoscedastic (Breusch. Pagan, 1979).

4.5.2 Multicollinearity

Multicollinearity is a problem that can occur in a regression when the independent variables are correlated with each other. This can result in that the p-values in a regression become unreliable. Therefore a VIF has been done to control for multicollinearity. VIF stands for variance inflation factor and its purpose is to see if there is any multicollinearity in a regression. A value of 1 concludes that there is no multicollinearity for a variable, a value between 1-5 can show that there is some multicollinearity but no major issues and a value over 5 makes the independent variable unreliable (Glen, 2020).

4.5.3 Standard Normal Distribution

Due to the large sample sizes which are used in the regression a test for skewness and kurtosis will be made to determine if our data follows a normal distribution or not. By doing the test the p-value for skewness will tell us if the data is symmetric and the p-value for kurtosis will tell us if the data has the right peak (Mishra et al. 2019).

5. **Empirical Results**

This section starts off with presenting the results from the regression and analysis. Thereafter, a robustness test is also included to test if the results are reliable. The section ends with tests of the OLS assumptions to see if the data used is viable for a regression.

5.1 Regression results

Below are tables 5.1.1 and 5.1.2 which show the results from the OLS-regressions. The rows of the tables show the independent variables, whilst the different columns in the table tell which dependent variable it is. Furthermore, the cells show the results of the coefficients from the regression and *** stands for P < 1%, ** stands for P < 5% and * stands for P > 5%

Table 5.1.1 Regression results

VARIABLES	(1) NYSEE	(2) NYSEV	(3) SPX
R_{t-1}	0.122***	0.0429***	0.00908
	(0.0166)	(0.0147)	(0.0145)
R_{t-1}	0.0333**	-0.00260	0.00473
	(0.0160)	(0.0144)	(0.0133)
Monday	-0.00225***	-0.00139***	-0.00114***
	(0.000200)	(0.000211)	(0.000221)
Tuesday	-0.000919***	-0.000323	-0.000186
	(0.000184)	(0.000199)	(0.000212)
Wednesday	-0.000212	7.11e-05	0.000169
	(0.000190)	(0.000199)	(0.000210)
Thursday	-0.000627***	-0.000348*	-0.000210
	(0.000190)	(0.000202)	(0.000211)
Taxation	0.00226***	0.000232	0.000210
	(0.000542)	(0.000538)	(0.000588)
June and July	-3.77e-05	-6.50e-06	0.000140
	(0.000168)	(0.000176)	(0.000186)
Event days WC	-0.00122**	-0.00129**	-0.00139**
	(0.000493)	(0.000514)	(0.000545)
Event days EURO	-0.000299	-0.000233	-0.000212
	(0.000558)	(0.000555)	(0.000585)
10 Highest	0.0917***	0.0775***	0.0776***
	(0.00600)	(0.00874)	(0.00517)
10 Lowest	-0.103***	-0.0966***	-0.0988***
	(0.00700)	(0.0101)	(0.0118)
Constant	0.00126***	0.000857***	0.000614***
	(0.000132)	(0.000141)	(0.000149)
Observations	18,448	18,448	18,452
R-squared	0.144	0.098	0.088

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.1.1 shows the results from NYSEE, NYSEV and SPX the regressions. The columns display which dependent variable it is and the rows the independent variables. Column 1 is with NYSEE as independent variable, column 2 is with NYSEV as independent variable and column 3 is with SPX as independent variable.

Table 5.1.2 Regression results

VARIABLES	(1) FTSE	(2) DAX
R_{t-1}	-0.00102	-0.0143
	(0.0152)	(0.0146)
R_{t-1}	-0.0246	-0.00840
	(0.0170)	(0.0160)
Monday	-0.000640*	0.000110
	(0.000341)	(0.000456)
Tuesday	0.000203	0.000283
	(0.000323)	(0.000432)
Wednesday	-0.000214	-0.000177
	(0.000320)	(0.000433)
Thursday	-0.000634*	-0.000294
	(0.000326)	(0.000434)
June and July	-0.000154	-5.18e-05
	(0.000294)	(0.000389)
Taxation	0.00111	0.00120
	(0.000746)	(0.00104)
Event days WC	-8.57e-05	-0.000183
	(0.000683)	(0.000875)
Event days EURO	-0.000495	-0.000812
	(0.000824)	(0.00103)
10 Highest	0.0744***	0.0890***
	(0.00476)	(0.00525)
10 Lowest	-0.0834***	-0.0873***
	(0.00701)	(0.00656)
Constant	0.000536**	0.000411
	(0.000234)	(0.000313)
Observations	9,737	8,964
R-squared	0.110	0.091

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.1.2 shows the results from FTSE and DAX the regressions. The columns display which dependent variable it is and the rows the independent variables. Column 1 is with FTSE 100 as an independent variable and column 2 is with NYSEV as an independent variable.

As can be seen in table 5.1.1 the regressions of the World Cup event days seems to have a negative relationship with daily NYSE returns and SPX returns. Evidence for this is that the P-values of all the regressions are significant. Moreover the coefficients are economically significant as well because the coefficients are between -0,00122 and -0,00139. If a conversion to percentage is made the results are between -0,122% and -0,139%. For example if a daily effect of -0,13% where present 15 times at the recent World Cup in Qatar which consists of 28 days (FIFA), the aggregated effect would lead to that the stock market would be approximately 1,93% (1-(1-0,0014893)^15 = 0.0.01932354574) lower than if the effect had not taken place.

However as seen in table 5.1.2 DAX and FTSE 100 does not have a significant relationship with World Cup matches since the p-value is over 5%. Therefore can not a conclusion be made that the DAX and FTSE are affected by the worldcup.

Furthermore all coefficients for the June-July effect P_t are insignificant. This indicates that the World Cup is driven by the football tournament and not by the June-July effect. To add the only weekday dummy which is significant in all US regressions is the Monday dummy. This indicates that Mondays could affect the return during the events.

All of the coefficients for the UEFA Euro event days are insignificant and thus can not a conclusion be made if the UEFA Euro tournament matches affect the US stock market.

Table 5.1.3: Return during the event days of the World Cup

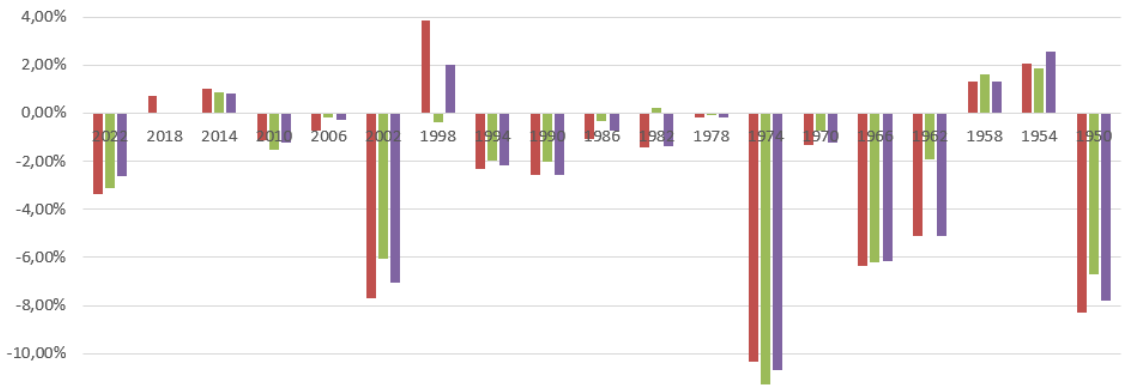

Table 5.2.3 displays the average compounded return of the SPX, NYSEE and NYSEV during the event period from 1950 to 2022, graphicly. The red line represents the return of the SPX, the green line NYSEE and the blue line NYSEV.

In table 5.1.3 the compounded return for each event period during the World Cups is calculated. The means for the returns on the SPX amount to -2,26%, NYSE composite equally weighted to -2% and NYSE composite value weighted to -2,24%.

5.2 Robustness checks

In this section robustness checks are studied on the NYSE equally weighted index. The robustness sections are divided into three segments: outliers, World Cup years and June and July. The outlier segment runs the regression but with removing the years 1974 and 2002 due to the abnormal negative returns during the event period which are in favor of the model. Moreover the World cup years robustness test only includes the World Cup years. This is to test to see if the years when the World Cup is not played reach higher returns than World Cup years, since some might argue that is a cause for lower returns during the event period. Finally the June and July test is done by only including the months of June and July each year. This test is made to see that no seasonal patterns are present (K&L, 2008).

Table 5.2.1 Robustness test

VARIABLES	(1) NYSEE with 2002 removed	(2) NYSEE with 1974 removed	(3) NYSEE wit 1974 and 2002 removed
Monday	-0.00217*** (0.000203)	-0.00217*** (0.000203)	-0.00217*** (0.000204)
Tuesday	-0.00107*** (0.000186)	-0.00107*** (0.000186)	-0.00108*** (0.000186)
Wednesday	-0.000313* (0.000190)	-0.000314* (0.000190)	-0.000314* (0.000190)
Thursday	-0.000621*** (0.000192)	-0.000621*** (0.000192)	-0.000620*** (0.000192)
Taxation	0.00287*** (0.000559)	0.00287*** (0.000559)	0.00287*** (0.000559)
June and July	-0.000110 (0.000165)	-0.000134 (0.000165)	-0.000168 (0.000166)
Removing2002	-0.00118** (0.000513)		
10 Highest	0.0855*** (0.00602)	0.0855*** (0.00602)	0.0855*** (0.00602)
10 Lowest	-0.105*** (0.00679)	-0.105*** (0.00679)	-0.105*** (0.00679)
Removing 1974		-0.000950* (0.000503)	
Removing 2002 and 1974			-0.000678
			(0.000536)
Constant	0.00138*** (0.000130)	0.00138*** (0.000130)	0.00138*** (0.000130)
Observations	18,456	18,456	18,456
R-squared	0.128	0.128	0.127

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.2.1 displays the results from the OLS robustness test which test the effects of removing outliers

from the NYSEE variable. Column 1 represents removing the event days from 2002, column 2 represents removing the event days from 1974 and column 3 represents removing the event days from 2002 and 1974.

Table 5.2.2 Robustness test

VARIABLES	(1) NYSEE with 2002 removed	(2) NYSEE with 1974 removed	(3) NYSEE wit 1974 and 2002 removed
Monday	-0.00217***	-0.00217***	-0.00217***
	(0.000203)	(0.000203)	(0.000204)
Tuesday	-0.00107***	-0.00107***	-0.00108***
	(0.000186)	(0.000186)	(0.000186)
Wednesday	-0.000313*	-0.000314*	-0.000314*
	(0.000190)	(0.000190)	(0.000190)
tors	-0.000621***	-0.000621***	-0.000620***
	(0.000192)	(0.000192)	(0.000192)
Taxation	0.00287***	0.00287***	0.00287***
	(0.000559)	(0.000559)	(0.000559)
June and July	-0.000110	-0.000134	-0.000168
	(0.000165)	(0.000165)	(0.000166)
Removing2002	-0.00118**		
	(0.000513)		
10 Highest	0.0855***	0.0855***	0.0855***
	(0.00602)	(0.00602)	(0.00602)
10 Lowest	-0.105***	-0.105***	-0.105***
	(0.00679)	(0.00679)	(0.00679)
Removing 1974		-0.000950*	
		(0.000503)	
Removing 2002 and 1974			-0.000678
			(0.000536)
Constant	0.00138***	0.00138***	0.00138***
	(0.000130)	(0.000130)	(0.000130)
Observations	18,456	18,456	18,456
R-squared	0.128	0.128	0.127

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.2.2 displays the results from the OLS robustness test. Column 1 represents only the years when a World Cup is played to test if the World Cup years return differ from non World Cup years. Column 2 represents only including June and July for each year to test for a seasonal effect.

To begin with, the results from the sensitivity test are not strengthening the results. As seen in table 5.2.1 the World Cup coefficient is not significant when 1974 and 1974 and 2002 are removed as event periods. This could possibly be a sign that the anomaly is a statistical anomaly and not a real one due the fact that the K&L paper (2008) was not released until 2008. These results differ from the results obtained by K&L, whose robust checks found that the World Cup days were significant even when excluding the outlier years. These results give ambiguous implications toward the question if the World cup anomaly has been weakened as a consequence of investors exploiting the effect or if it just is a statistical

occurrence that has been found in the data. On one hand the basic regression provides evidence that the anomaly is apparent which is backed up by the fact that the trading strategy has been profitable over the whole period (See section 6.2 in the discussion). On the other hand, the robustness checks imply that some specific World Cup periods might overstate the effect. Thus, we cannot conclude whether the World Cup anomaly is real or purely statistical based on what we have found. We can only say that there is some evidence for an anomaly, although it seems as if the effects of it have been reduced.

Furthermore, the World Cup coefficient in the regression which only includes the World Cup years is not significant. Therefore we can not conclude if the years differ in return since the value of the coefficient is not significant. In the original article from 2008, the World Cup coefficient was also found to be significant in the robust checks, raising further queries regarding if the World Cup rather is a statistical anomaly than one that distorts the markets.

Lastly the June and July tests confirm that no June and July effect is present in the regression. This is confirmed since the World Cup coefficient is significant and thus there is no seasonal effect in place. These results are in line with the robustness checks conducted byK&L, who also had significant results.

5.3 OLS assumption testing

In this section will the results from the OLS assumption testing models be presented.

5.3.1 Heteroscedasticity

A Breusch Pagan test has been done on the data used in regression 1-5 and the results can be found in the appendix under *Table 1*. The test points towards that the data used in regression 1, 2, 3 and 5 are heteroscedastic since the p-values are less than 5% whilst the data in regression 4 seems to be homoscedastic due to a p-value greatly over 5%.

5.3.2 Multicollinearity

The results from the VIF test on the 5 regressions can be found in the appendix under *Table 2*. As can be seen the independent variables have a low score. Furthermore all of them besides the weekdays are under 1,25 thus concluding that the p-values are reliable.

5.3.3 Standard Normal Distribution

In the appendix under *Table 3* the results of the tests can be found. All of the dependent variables are not normally distributed according to the tests. Since all of the tests show a p-value lower than 1% on both the test for skewness and kurtosis.

6. **Discussion**

In this section are the results discussed. The discussion starts with examining the results from the regressions. Next, an examination of a trading strategy is outlined and presents how someone could exploit the World Cup effects. Then a short discussion regarding the OLS assumptions is in place. And lastly the limitations of the article are presented to inform the readers of the possible flaws or areas of uncertainty.

6.1 The results

The results suggest that the World Cup has a slightly negative daily effect on the NYSE market but only at a 5% significance level. This is not fully in line with K&L (2008), who found this to be highly significant at the 1% level. Unlike the former article, we tested to see if the football loss effect is found in the SPX market. We find that the football loss effect is negative and significant at a 5% significance level similar to the NYSE. Therefore we reject the null hypothesis at the 5% significance level and conclude that the NYSE and the SPX markets are affected by the football loss effect and therefore are not fully efficient during the World cup. Furthermore, the coefficient has decreased in both size and statistical significance. This could suggest that the overall negative sentiment effect from the anomaly has weakened, implying that investors might have started to exploit the World cup anomaly, but not to the point that it has disappeared. Further proof of this can be found from table 5.1.3 since the mean return during the period has increased. This increase is due to larger returns in the period after 2006 compared to earlier tournaments.

Moving to the markets overseas, the results show that both World Cup coefficients for FTSE and DAX are negative but not statistically significant. Therefore we do not reject the null hypothesis and conclude that the two European markets are efficient and unaffected by the World Cup. Reasons for this might be that the FTSE and the DAX are not as financially integrated around the world compared to the two US markets. One could argue that international investors possibly do not hold enough assets in proportions big enough in these markets for the football loss effect to spill over to these markets to the same extent as the American markets. As we find no evidence that the European markets experience a decline during the World Cup periods, it is most likely that these markets are not distorted by the World Cup.

One of this papers main contributions to the extend the work of KL (2008), was to test if the football loss effect was apparent during the UEFA Euro cup to see if there was an UEFA Euro Cup anomaly. For the UEFA Euro cup effect we found that all five regression models had a negative impact, but not on a statistically significant level. Therefore we cannot reject the null hypothesis, and conclude that all five markets tested are unaffected by the football loss effect during the UEFA Euro cup period. There could be many reasons for why it is not significant. The framework we developed to explain the football loss effect might be wrong or oversimplified. A portion of the investors attention might be shifted from the market to the football event and arouse negative sentiment among investors. This does not necessarily spill over to the markets and cause overreactions. It might simply be that investors do not let their feelings from the sporting event affect their investing behavior. This argument is in line with the null hypothesis that US markets are efficient during the UEFA Euro cup. Other reasons for it to not be significant could be that the smaller international football tournaments are less engaging, that sample size of games are too small or that the UEFA Euro event period is too short. The UEFA Euro cup is generally played during a shorter time period compared to the World cup, while also having less teams participating. As less teams are playing, less teams are losing, which implies that the aggregated negative effect driven by investor sentiment could possibly be smaller compared to the World Cup. One could therefore argue that the effect from the European cup might be too small to have a noticeable effect on the markets tested.

Since we do not find any football loss effect in the European markets tested in this tournament as well, we cannot conclude that the European markets are affected by the football tournaments. A possible explanation why the European markets are not affected could be because they are less globally integrated compared to the US markets.

Furthermore, we want to put emphasis on the variable controlling for the monday effect and its implications for the regressions. The results show that the Monday effect is highly significant in the US markets tested and has a negative effect on them. This finding is in line with the Monday effect in itself but one could argue that it might have bigger impacts during football tournaments. The reason for this is that a large share of group stage matches, and more importantly, big elimination games are played during weekends. In this regression model, the outcomes of matches are expected to affect the markets the next trading day, which is Mondays.

This means that the aggregated sentiment effect of matches played during the weekend and matches which finish after the close of the NYSE and SPX on friday are released upon the markets the first day after the weekend, which is the monday. However, an argument can also be made that Mondays have an economically insignificant or small effect during the event period. Support for this based on that the mondays compose around a fifth of the trading days which turn out to around 3-4 trading days out of around 18-22 trading days.

6.2 Trading strategy

The trading strategy which is deployed to see if there is an opportunity to exploit the World Cup is the same as K&L used. First a calculation of the annual return is made which represents a normal Hold strategy and secondly a calculation of the annual return will be made but during the event period the index will be sold and instead invested into 3 month US treasury bills (K&L, 2008).

The strategy will be implied for the event years between 1954 until 2022. The year of 1950 will be excluded since the daily discount for 3 month US treasury bills is not available from the Federal Reserve Economic Data.

Table 6.2.1 Results of hold and trading strategy

	Avg. Return, Hold	Avg. Return, Sell during the event period	Excess return of selling during event period
SPX	3,36%	4,79%	1,43%
NYSEE	7,37%	9,43%	2,07%
NYSEV	6,20%	7,80%	1,60%

Table 6.2.1 details the return of 1 dollar invested in the NYSEE index from 1954 to 2022. The first column represents if a simple hold strategy was implied, the second column represents if the selling strategy was used and the third column is the excessive return of the sellings strategy in relation to the hold strategy.

As seen in table 6.2.1 the strategy of selling the equity during the event period and purchasing treasury bills outperformed the normal hold strategy on an average basis.

Table 6.2.2 Graph of hold and trading strategy on NYSEE

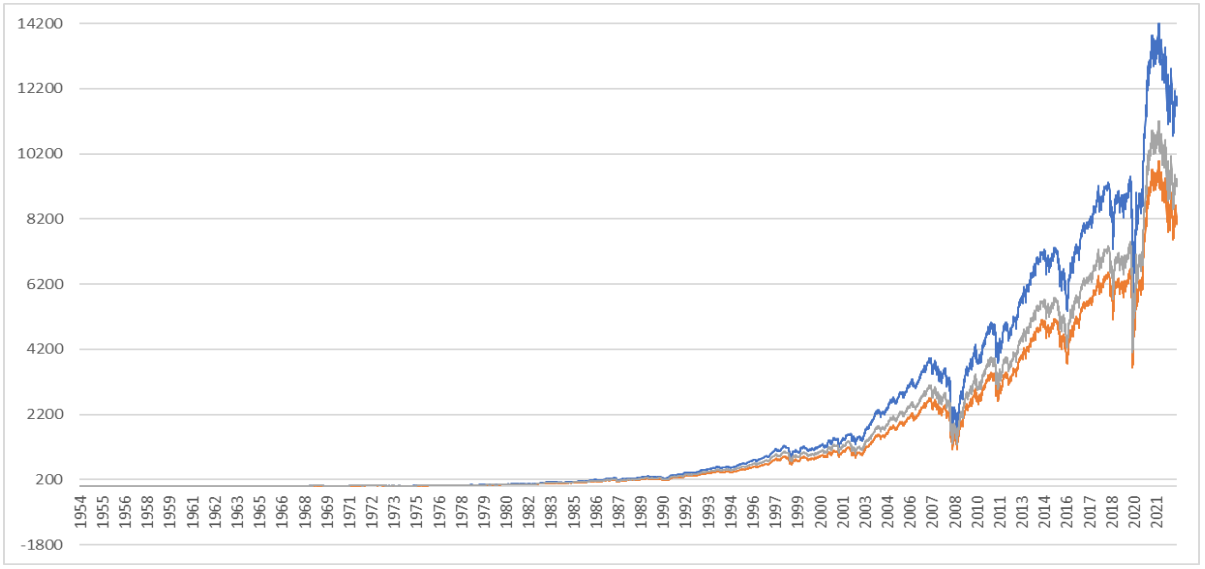

Table 6.2.2 details the return of 1 dollar invested in the NYSEE index from 1954 to 2022 graphicly. The blue orange represents if a simple hold strategy was implied, the gray graph represents if the selling strategy was used and the third graph represents if the selling strategy was used but not using the strategy in 1974 and 2002.

Table 6.2.2 shows an illustration of the return if 1 dollar was invested from the 1st of January 1954 until the 30th of December 2022 in the equally weighted NYSE Composite Index. The blue graph displays if the equity was sold and 3 month treasury bills was bought during the event periods, the orange represents only holding the SPX index for the whole time and the gray graph displays if we use the selling strategy but not selling the equity for 1974 and 2002 since they are outlier years. The final value of the selling strategy ends on the value 11928$ compared to the holding strategy which ends on the value 8220,7$ and the adjusted strategy ends up on 9413,3$. Thus, historically the World Cup strategy has outperformed the holding strategy by approximately 45,1%. and the adjusted strategy by 14,5%. Furthermore the sharpe ratio is also increased in the selling strategy since a higher return is achieved but with lower risk due to that 3 month treasury bills are considered as risk free assets.

6.3 OLS assumption results

The results from section 5.2 were made to analyze the validity of the regression. To begin with, the Breusch Pagan test suggests that regression 1, 2, 3 and 5 are heteroskedastic. To address this problem we introduced robust standard errors. Moreover, the VIF test showed no signs of multicollinearity and the skewness and kurtosis test showed that our data is not normally distributed.

6.4 The limitations

The R^2 values in the regressions vary from less than 1% and go up to around 14,4%. The R^2 values are low and it is important to remember that many variables which affect the US stock market are left out. Thus we can conclude that the World Cup is significant, however we can not conclude if the effect is leading the market's returns or if the effect gets crowded out by larger variables which are not covered in this paper.

Furthermore, a limitation in the article is that the trading section does not include trading costs since we were not able to find any sources where we systematically could include historical trading costs for the whole period. Thus the net return of the trading results are most likely going to be lower. Especially since commission and other trading costs were larger before compared to when this paper is written (Jones, 2002). In addition, historically the trading strategy has been profitable but historical returns are not a guarantee for future returns. Thus, can not these findings predict the future with 100% accuracy and also in consideration with the low R^2 values. The findings may also contribute to Availability Heuristics i.e that someone puts too much weight on our findings to simplify the complexity of investing and future returns instead of gathering other available information (Folkes, 1988).

Another topic to discuss is the validity of the regression. Since the robustness tests did indicate that the results could be problematic. Since when the regressions were controlled for outliers the year of 1974 and years of 1974 and 2002 made the World Cup coefficient insignificant and reduced it to 5% significance when removing only 2002. However the results are not sufficient enough to tell if it's due to a reduction in the effect because of people adopting the trading strategy or if the anomaly just is a statistical anomaly. Further research has to be done to draw any further conclusions.

Furthermore, this article does not cover all of the aspects of the World Cup and the stock market. For example, further research can be done to see if a volume or volatility is affected and if a trading strategy can be built from that. Or to test for other dependent variables such as the S&P 600 Small Cap Index, since according to Edman et al, smaller stocks were the most affected stocks from the loss effect (2007). Another aspect which someone might argue is important is that the article is built on the assumption that only losses affect the stock market. This is based on the previous research of Edman et. al (2007). However, the research is approximately 16 years old while this paper is written. Therefore could the findings in the article be reviewed and revised to control if football matches which draws or wins affect the market.

Lastly, the observations in this study have increased by approximately 28,4% compared to KLs' paper. And according to a paper by Wood et. al (2004), increasing the observations by 20% would possibly make the p-value less significant with a probability of 30%. Thus some may say that the results in this paper are not reliable and comparable with KLs' results since this paper acquired less significant results. On the other side the results became less significant in the robustness tests when observations were removed. Therefore, could another research topic be to do substantially more robustness tests, where different time intervals are tested and etc.

7. **Conclusion**

The conclusion consists of a summary of the major findings in our research and what conclusions can be made. In addition is a section included where the authors recommend further topics of research regarding the subject.

To conclude the paper, this study is a continuation of the research done by Kaplanaksi and Levy from 2008 and with adding the dependent variables, DAX, FTSE 100 and SPX. The results from the NYSEE, NYSEV and SPX regressions goes in line with previous findings that there is a World Cup anomaly in the form of a negative relationship between the FIFA World Cup event and US equity indexes. This was also shown by implementing a trading strategy which focused on avoiding the World Cup days and instead investing into 3 month US treasury bills. And the strategy outperformed a normal hold strategy by 45,1% dating between 1954 and 2022. However in our study we saw a weakening relationship in relation to the previous findings as the coefficient had increased (moved closer to zero) and due to less significance whilst having a larger sample. Moreover the robustness could provide evidence that the anomaly only is a statistical anomaly but further research has to be done to draw any conclusions. Furthermore, the World Cup coefficient for DAX and FTSE 100 was not significant thus we can not conclude in this study if the World Cup affects the European markets.

In addition, this study also included the UEFA EURO tournament as an independent variable. The results from all of the regression indicates that the UEFA EURO tournaments do not affect the European or the American stock market. This is supported by the evidence that none of the regressions had a significant UEFA EURO coefficient. But it is also to keep in mind that the UEFA EURO sample was smaller in comparison compared to the World Cup sample. Due to it being a smaller tournament both in terms of matches and nations competing but also since it was founded after the World Cup. Therefore we believe that further research could be interesting to pursue when future tournaments have been played to increase the sample.

Finally, the area between stock markets and football matches is a large area, thus we have not been able to cover everything in this paper. Therefore, would we encourage further research into this topic. For example, how volume or volatility is affected to see if there is a potential

trading strategy, how other indexes are affected such as the S&P 600, include more tournaments such as the Asia cup, Afcon or Copa America or to investigate which regions the trading volume is sourced from in the US stock market during the World Cup period.

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9. Appendix

Table 1 - Breusch Pagan test results

(1)

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of SPX

         chi2(1)      =   707.30
         Prob > chi2  =   0.0000
```

(2)

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of NYSEE

         chi2(1)      =   282.79
         Prob > chi2  =   0.0000
```

(3)

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of NYSEV

         chi2(1)      =   215.56
         Prob > chi2  =   0.0000
```

(4)

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ReturnDAGS

         chi2(1)      =     0.11
         Prob > chi2  =   0.7386
```

(5)

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of RFTSE

         chi2(1)      =    14.08
         Prob > chi2  =   0.0002
```

Table 2 - VIF test results

(1)

Variable	VIF	1/VIF
Wensday	1.59	0.627433
Tuesday	1.59	0.627734
Thursday	1.59	0.630252
Monday	1.57	0.637411
JuneandJuly	1.19	0.841772
EventdaysWC	1.11	0.898871
EventdaysE~O	1.08	0.929840
HögstSPX	1.01	0.990903
Return2dag	1.01	0.992899
Return1dag	1.01	0.993506
Taxation	1.00	0.995569
LägstSPX	1.00	0.998621
Mean VIF	1.23	

(2)

Variable	VIF	1/VIF
Wensday	1.60	0.626343
Tuesday	1.60	0.626564
Thursday	1.59	0.629885
Monday	1.57	0.637217
JuneandJuly	1.19	0.841782
EventdaysWC	1.11	0.898850
EventdaysE~O	1.08	0.929843
I	1.03	0.968631
H	1.03	0.969825
HögstNYSE	1.02	0.980670
Taxation	1.01	0.989567
LägstNYSE	1.00	0.996587
Mean VIF	1.24	

(3)

Variable	VIF	1/VIF
Wensday	1.59	0.627081
Tuesday	1.59	0.627660
Thursday	1.59	0.630062
Monday	1.57	0.637430
JuneandJuly	1.19	0.841797
EventdaysWC	1.11	0.898934
EventdaysE~O	1.08	0.929844
P	1.02	0.984333
HögstNYSE	1.01	0.986792
O	1.01	0.992850
Taxation	1.00	0.995396
LägstNYSE	1.00	0.997272
Mean VIF	1.23	

(4)

Variable	VIF	1/VIF
Wen	1.61	0.622196
Thur	1.61	0.622310
Tue	1.61	0.622355
Mon	1.60	0.623857
JuneJuly	1.24	0.809398
EventWC	1.12	0.891142
EventEM	1.12	0.896253
Taxation	1.01	0.994667
R2	1.00	0.996252
Higest	1.00	0.996262
Lowest	1.00	0.996929
R1	1.00	0.997124
Mean VIF	1.24	

(5)

Variable	VIF	1/VIF
Wen	1.61	0.621795
Thur	1.61	0.621958
Tue	1.61	0.622810
Mon	1.58	0.631991
JuneJuly	1.23	0.810054
EventWC	1.12	0.890172
EventEM	1.11	0.898682
Higest	1.01	0.988468
R1	1.01	0.989777
R2	1.01	0.993522
Taxation	1.00	0.995197
Lowest	1.00	0.996211
Mean VIF	1.24	

Table 3 - Skewness and Kurtosis test results

(1)

				joint	
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
SPX	18,457	0.0000	0.0000	.	.

(2)

				joint	
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
NYSEE	18,456	0.0000	0.0000	.	.

(3)

				joint	
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
NYSEV	18,456	0.0000	0.0000	.	.

(4)

				joint	
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
ReturnDAGS	8,966	0.0002	0.0000	.	0.0000

(5)

				joint	
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
RFTSE	9,739	0.0000	0.0000	.	.