ERASMUS UNIVERSITY ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS
Bachelor Thesis Economics & Business

Football induced mood and stock index returns

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Finish date: 09-07-2023

The views stated in this thesis are those of the author and not necessarily those of the supervisor, second reader, Erasmus School of Economics or Erasmus University Rotterdam.

ABSTRACT

In this research, I study whether the results of the Dutch football team on international games have an effect on the stock index returns of the Netherlands. For this research I use the results on official games played by the Netherlands from 2004 until 2022 and analysed them against the daily returns on the MSCI Netherlands stock index during the same timeframe. I find regular games played by the Netherlands to have no significant effect on index returns. On the other hand, World Cup losses by the Netherlands show a negative relationship with their index returns. Additionally, I find World Cup losses by the Netherlands to have a significantly stronger effect on their stock index returns than losses on regular games. This negative effect on stock returns suggests football induced mood could influence investing behaviour.

Keywords: Stock index returns, football, mood

JEL codes: G41

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1 Introduction

Mood, or the way a person is feeling in a particular time will most likely have an impact on their behaviour. As shown in a study by Nofsinger (2005), the general level of optimism or pessimism in society will be correlated to stock returns given that the emotions are shared across economic participants. An optimistic mood will be reflected in higher stock returns while pessimism will lead to lower stock returns (Goetzmann et al., 2013). Furthermore, Wann et al. (1994), showed that sports fans reported an increase in positive emotions after a win by the team they support and an increase in negative emotions following a loss Wann et al. (1994), then shows that sports results will have a similar effect on the mood of large groups of people and might affect behaviour in society as a result. Football is the most followed sport in the world which is shown by the fact that 1.5 billion people watched the World Cup final in 2022 which saw Argentina crowned champions (Jones, 2023). Given the popularity of this sport it has an impact on the life of many people as the team someone supports becomes part of their identity. It is for this reason that it is interesting to study if this sport can affect rationality from fans when it comes to economic decisions.

Previous research by Edmans et al. (2007) studied the relationship between results on international sports games and stock returns by examining the return on the local stock market the day after an international game was played. The results of the paper found a negative relationship between the instances where a number of countries lost an international football match and stock returns in those same countries for the period between 1973-2004. The research did not find a significant relationship between the games won by the same countries and their stock returns. This finding would then show that markets do not behave in a rational way and can therefore be affected by emotions at least when dealing with losses but this does not appear to be the case following wins. Additionally, a paper written by Klein et al. (2009) tested this relationship for several European countries using different econometric models and testing for a different period between 1990-2006. However, their study found no significant relationship between international football wins and losses and stock returns. This in turn suggests that markets do behave in a rational way and are unaffected by mood changes. I believe a possible explanation for the difference in their findings could lie in the model and the timeframes that were studied in these papers. In their conclusions Klein et al. (2009) stated that replication studies should be considered which in its own is a reason to study this topic again. Furthermore, in 2007-2009 an important economic recession took place which had an influence on investor behaviour and might have an impact on this relationship. Additionally, as of writing this paper another recession is taking place which again might have an interesting impact on investor behaviour (Auerbach et al., 2022). The aim of this research is therefore to analyse what the relationship between football games and stock returns looks like in recent years.

In this study I will replicate the research by Edmans et al. for the period 2004-2022. While the research done by Edmans et al. focused on a number of countries and studied more than one sport, my research will be focused specifically on the Netherlands and the Dutch stock market. Additionally, my study will only examine the effects of football on stock returns since it was found that this sport produced the largest effects on stocks. The Netherlands is an interesting country to test previous findings for two main reasons. First, the Dutch stock market was used for both the studies of Edmans et al. as well as Klein et al. so it stands to reason to use it again to make an appropriate comparison. Second, the Netherlands is a country where football is considered the most important sport (Chebbi, 2022). Furthermore, replicating the study for the years 2004-2022 is also a good way to test the robustness of the findings made by Edmans et al given that the 2007-2009 recession had a strong impact on investing behaviour. This change on investors could then lead to different results or at least difference in the magnitude of the effects found previously. Taking previous research as my starting point and with the objective of adding to existing literature, I arrive to the main question this research aims to answer. How does the result of the Dutch national team in an international football match affect the Dutch stock returns?

The way in which I am going to analyse this relationship is by use of a multiple regression where returns on the Dutch stock index is considered the dependent variable while a win or a loss in an international game will be treated as dummy variables. The data that will be used for football results are all the games played by the Dutch national team from January 2004 through December 2022 on international championships. This means I will be using the results of 147 games. On the other hand, the data from the Dutch market will be gathered from Datastream. Returns are going to be computed using the Morgan Stanley Capital International (MSCI) Netherlands index and measured in percentages. The returns will be analysed during the same period as the football matches meaning from 2004-2022.

My research used Netherlands international football results as a mood variable to test for possible effects on the Dutch stock index returns. Based on previous research by Edmans et al (2007) as well as Klein et al. (2009) I expected losses on international games to have a larger effect on the stock index than international wins. Using a time series on Dutch index returns, I found that neither losses nor wins on regular international games have a significant effect on returns on the Netherlands stock index. On the other hand, my study found a negative and statistically significant effect of losses on World Cup games played by the Netherlands football team on Dutch index returns. Additionally, the coefficient corresponding to losses on World Cup games was found to be statistically larger than the coefficient corresponding to losses on regular games. Meanwhile the coefficient corresponding to wins on World Cup games did not show a statistically different magnitude from the coefficient on regular wins. My study concludes that World Cup losses by the Netherlands football team has a negative relationship with their stock index and could then lead to arbitrage. However, I am aware that the effect caused by international games on stock returns is one of many factors that can impact investing decisions and believe there are still some relevant studies to be made in this area in the future.

The remainder of my research is organized in the following way. Section 2 explains the relevant literature that motivated investigating the link between football results and stock index returns. In section 3 I describe the relevant variables used in my research as well as an overview of the relevant football competitions used for my study. Section 4 of my study shows the relevant transformations and statistical methods used for my analysis. In section 5 I present and discuss my results which show no statistically significant effects of results on regular football games on Dutch stock index returns. Section 5 also documents a statistically significant higher relationship between World Cup losses and Dutch stock index returns. Section 6 summarizes my findings and concludes my research.

CHAPTER 2 Theoretical Framework

2.1 Stock Index Returns

There are external factors that affect stock returns which are not directly related to company's characteristics and usually affect multiple companies at once and will therefore be reflected on index returns. Macroeconomic factors that might arise because of a shock in the state of the economy have a systematic effect on stock market returns. As shown by Chen et al. (1986) inflation both expected and unexpected as well as the spread between long and short interest rates are priced in stock indexes. According to Prechter and Parker (2007) these changes in a stock index are an indicator of social mood since investors will show their optimism or pessimism by buying or selling stocks. The study by Hjalmarsson (2009) also found a correlation between short term interest rates as well as the term spread on stock returns. The relationship he found however was only present in developed markets. Part of the effects found in this study could also be explained by social mood since Geer (2006) found that these economic trends could be influenced by social level of optimism. In a similar way, the stock market can also be affected when there is a shock in the price of a specific commodity. An example of a product that impacts the stock market is oil given that it represents a sizable portion of the GDP of several countries, and it can affect the supply of other goods. Cunado and Perez de Gracia (2014) tested the effect of an oil price shock on several European real stock returns and found a negative and significant effect which was mostly driven by oil supply shocks.

Sudden shifts on stock prices are a reflection of the changes in expectations from investors on either firm's future performance or economic conditions. There are several factors causing expectations to change. Some examples are news regarding the earnings or dividends paid by a company, macroeconomic factors previously discussed or overconfidence which is influenced by investor mood (Koellinger & Treffers, 2015). As shown by Bondt and Thaler (1985), unexpected and dramatic news lead to an overreaction in the change of stock prices. These overreactions can be the result of overconfident estimations correcting themselves when new information becomes available. This phenomenon is also linked to investor mood given that it has been found that overconfidence is influenced by mood (Koellinger & Treffers, 2015). The degree to which the market will overreact to new information is also influenced by the level of uncertainty surrounding the news. Greater information uncertainty leads to higher overconfidence after good news and therefore higher expected returns while it also leads to underconfident forecasts and therefore lower expected returns after negative news (Zhang, 2006). The degree of overreaction also depends on the type of stock investors own, since growth stocks show a larger negative price response following negative earnings news as compared to value stocks. This asymmetry is originated because of investors' expectations since they tend to have

overoptimistic forecasts of the future of growth stocks which are corrected after negative earnings news (Skinner & Sloan, 2002).

As mentioned before, the general mood of investors can have an important effect on stock prices. Good mood leads to an optimistic view of future conditions and to perceive stocks as being under-priced, while a bad mood leads to opposite perceptions (Goetzmann et al., 2013). For stock index prices to change as a result of mood, there has to be an event or continuous variable that causes a simultaneous unidirectional change in mood on a number of people. An example of such an event was studied by Hirshleifer and Shumway (2003) who found a positive relationship between sunny days in cities of a country's leading stock exchange and the daily market index returns of these countries. Additionally, Drakos (2010) found that on the day where terrorist activity took place in a given country the stock returns of that country lowered significantly. Furthermore, Edmans et al. (2021) found a positive relationship between positive music listened to in certain countries in a week and the stock returns of these same countries.

2.2 International Football

Football and sporting events in general have been around for centuries and as such play an important part in the economy. Given the impact sports have on the economy, sport teams make big expenditures on things like sporting facilities, players signings and salaries, training staff and more. On occasions, governments might also spend large budgets on sports, the reason for this being that these expenditures generate more consumer satisfaction that other investments. Additionally, and more significant, it is often thought that these investments improve the economy since they generate jobs. Noll and Zimbalist (1997) first studied whether this actually holds in reality but concluded that new sports facilities had an extremely small effect (if any) in economic activity. However, fast forward to present times and large expenditures are still destined to sporting events. It is estimated that $6.5 to $10 billion were spent by Qatar on building stadiums for the World Cup in 2022 while a total of around $220 billion was spend in preparations for the football event (Craig, 2022). While it is not clear whether these investments have an overall positive effect, there is no denying there are large economic incentives surrounding them. These economic incentives mainly come from the fact that football has a big effect on economic behaviour incurred by fans. A huge amount of money is destined to sports by fans and followers who buy tickets to sporting events, TV subscriptions, merchandise of certain clubs and players or betting on sports results. Given all the expenditures made by fans, the Premier League, the top football league in England, produced an estimated revenue of $6.2 billion in the 2021-22 season alone (Poindexter, 2022).

Although large amounts of money are spent yearly by fans supporting their teams, the impact the performance of a football team has on supporters goes far beyond economic expenditures. Football results also have a psychological effect on fans since there is a large amount of evidence showing that

they impact fans' mood and their view on life in general. Schwarz et al. (1987) as well as Vallerand et al. (2008) found that following a win in the World Cup, fans who supported the winning country showed a larger self-reported well-being, as well as increased self-esteem and overall life satisfaction. The impact football results have on mood is often translated into positive behaviour like gratitude towards players from your supported team following a win. On the other hand, football fans tend to show negative behaviour following a loss which is often translated into acts of racism or violence (Card & Dahl, 2011). As recently as 2022, there were 124 deaths in Indonesia after the fans of the losing team rushed the field and began fights (Ratcliffe, 2022). The effect of football results on mood can go far beyond behaviour and has even been shown to influence health. A study by Berthier (2003) found that deaths caused by myocardial infarction were lower in men in France in the day of the 1998 World Cup Final which was won by the French team. On the other hand, Carroll (2002) found that risk of acute myocardial infarction went up by 25% in England following their loss against Argentina in the 1998 World Cup.

2.3 Relationship between Stock Index Returns and Football

Taking our previous discussion as well as previous research into consideration we can see that football has an effect on people's behaviour and decision making. Additionally, it is also the case that negative results on football games have a stronger reaction by fans that positive one's since they are proven to be related with more instances of health issues or violent behaviour (Carroll, 2002). Football clearly affects behaviour in many different ways and investment decisions are no exception. Floros (2014) studied the effect of match results on European championships on Juventus' stock returns. The study found that ties and losses on European matches lead to a decrease in the clubs' stock returns while wins lead to an asymmetric increase in their stock returns. This study shows a relationship between football results and stock returns, however it does so only on the stock of a team and does not demonstrate an influence on overall investing behaviour. Edmans et al. (2007) found a negative relationship between the times a national squad lost an international game for several different sports and the stock returns of this country. This study also found that football results produced the largest reactions on stock returns.

In my study I will replicate the analysis by Edmans et al. (2007) that measures the effects of international sports results on stock returns by measuring national stock indexes from 1973-2004. In their analysis Edmans et al. (2007) studied the relationship between results on international football games and stock returns by examining returns on the local stock index the day after an international game was played. The study argued that given the fact that football results have a similar effect on mood for people belonging to the same country they could lead to irrational investing behaviour for a large portion of people in a same nation. Furthermore, they argued that this irrational behaviour would be reflected in the local stock index. Their reasoning for this assumption was that because of home bias, or the fact that a large portion of the owners of a stock usually belong to the same country as the company, a change in

the mood on investors would spill-over to their national stock index returns. For my research I will focus on the Netherlands international football team and the Dutch stock market. Replicating Edmans et al. study for the years 2004-2022 is a good way to test the robustness of their findings given that the 2007-2009 recession had a strong impact on investing behaviour. Despite this change in behaviour, I still believe that football games played by the Dutch team will have an effect on the Dutch national stock index. The reason why I believe this relationship still holds comes from the strong impact football still has on the life of many people as was discussed above as well as the shown link between mood and stock returns. Taking into consideration everything previously stated, I reach the following hypotheses.

H1: *A loss/win by the Dutch national team will have a negative/positive relationship with Dutch stock market returns.*

When trying to analyse the effects that football games have on players as well as fans, there are additional factors that need to be considered besides results themselves. In a similar way as it has been found with results, these additional factors can be translated to investment decisions by fans. In the case of national teams, an important factor to be considered is the importance of the game they are playing since losing in a qualifying game will most likely not have the same effect on fans' mood as losing a World Cup Final. Losing a World Cup Final will have a more negative effect on fans for several reasons like the expectations built around the game and the fact that after losing the game the team is automatically out of the competition. In line with this, Ashton et al. (2003) researched the effect of football games played by the English football team and stock returns on the London exchange. The study found that the relationship between results and returns was stronger on tournament games than on qualifying games. Taking these findings into account I reach my next hypothesis:

H2: *A win or a loss by the Dutch national team in a World Cup match will have a stronger relationship with changes on the Dutch stock market compared to regular games.*

CHAPTER 3 Data

3.1 Sample

The data that I will use for my study was obtained from Datastream which contains financial information on multiple countries including their stock returns. These returns will be included in my study using a price index and measured in Euros. The price index I used for the Dutch stock is the MSCI Netherlands Price Index where I will analyse 4946 observations which correspond to the daily returns on the market from the period January 2004 to December 2022. The data corresponding to the football results from the games played by the Dutch national team during the period January 2004 to December 2022 were gathered from Kaggle which contains a dataset on international football results. The friendly games played by the Dutch team were excluded from the sample since they are not as followed by fans and usually, they are not given a lot of importance by neither fans nor players. This means that the results I will include in my study correspond to the games played by the Dutch team on the World Cup, UEFA European Championship (EURO), Nations League as well as the qualifying games to these competitions. In total there were 147 observed games played during this period including 102 wins and 27 losses by the Dutch team.

3.2 Variables

Given the fact that the index shows only the closing prices in each given day, I had to make a transformation before being able to use the data. I took the difference between the closing price of the index with the value it had on the previous day and divided it by the value on the previous day to obtain the daily return on the index (*Rdm_t*). Additionally, I will use the lagged returns in the Dutch index returns as part of my model given that they might have autocorrelation with the sample and leaving them out would probably affect the reliability of my model. Additionally, the instances when the Dutch national team won a relevant game are transformed into a dummy variable (*Ddw_t-1*). This variable therefore takes a value of one on the days the Netherlands won an international game and zero otherwise. I also made a similar dummy variable (*Ddl_t-1*) for the times when the Dutch team lost a game which takes a value of one for a loss and zero otherwise. Finally, I included the dummy variable (*Ddwwc_t-1)* that takes a value of one if the Dutch squad won a game in the World cup and (*Ddlwc_t-1*) that takes a value of one if the Dutch squad lost a game in the World Cup.

Table 3.1 Descriptive Statistics of the relevant variables.

Variable	Mean	Std. Dev.	Minimum	Maximum
Rdm	0.0003	0.0133	-0.1072	0.0943

Table 3.1 shows that *Rdm* has a mean of 0.0003 which signifies that during the studied period, the Dutch market had a positive return of 0.03% on average on a daily basis. The minimum value is -0.1072 meaning during this time the most negative return on the market was -10.72%. The maximum value on the other hand is 0.0943 which means that during the studied time the highest increase on the market was 9.43%. The variables for game results are excluded from the table since they are dummy variables and therefore not very informative.

Table 3.2 Overview of football Games played by the Netherlands from 2004-2022.

Year	Games Played	Wins	Losses	Win percentage	Loss percentage
2004	9	4	2	44.44%	22.22%
2005	8	7	0	87.50%	0.00%
2006	8	5	1	62.50%	12.50%
2007	8	5	2	62.50%	25.00%
2008	7	6	1	85.71%	14.29%
2009	5	5	0	100.00%	0.00%
2010	11	10	1	90.91%	9.09%
2011	6	5	1	83.33%	16.67%
2012	7	4	3	57.14%	42.86%
2013	6	5	0	83.33%	0.00%
2014	11	8	3	72.73%	27.27%
2015	6	2	3	33.33%	50.00%
2016	4	2	1	50.00%	25.00%
2017	6	4	2	66.67%	33.33%
2018	4	2	1	50.00%	25.00%
2019	10	7	2	70.00%	20.00%
2020	6	3	1	50.00%	16.67%
2021	14	10	2	71.43%	14.29%
2022	11	8	1	72.73%	9.09%
Total	147	102	27	n/a	n/a

Table 3.2 shows that the year with the largest amount of games played was 2021 which is probably related to the fact that many games were postponed from 2020 because of the COVID-19 crisis. The most amount of wins in a year by the Netherlands is 10 wins which they obtained both in 2010 and 2021, but they played less games in 2010 leading to a higher win percentage in that year. Meanwhile, the biggest win percentage achieved in a year was in 2009 with a win percentage of 100%. On the other hand, the highest loss percentage by the Dutch team during this period came on the year 2015 when they lost 50% of the games played.

3.3 Control Variables

The control variables that I will use in my study are similar to the ones used by Edmans et al. (2007) in order to keep the study consistent. In this study it was argued that given that international stock markets are integrated, there will also be correlation across countries. To account for this correlation, I gathered

4946 observations on the world stock market from the MSCI International World Price Index corresponding to the same period as the Dutch stock returns which I also retrieved from Datastream. In total 6 observations were excluded from the sample in the instances when data was available only for the Dutch price index but not for the world index or vice versa. In a similar manner as I did with the Dutch returns, I generated the variable (*Rwm_t*) by taking the difference between the closing price of the world market index with the closing price on the previous day and divided my result by the price on the previous day to obtain the return on the index. Furthermore, I included dummy variables for every weekday given that there are usually differences in stock returns depending on the day of the week and adding this variable is a way to control for a spurious correlation (Fishe et al., 1993). With that in mind, Monday is represented by the dummy variable (*Mday_t*), Tuesday by (*Tuday_t*), Wednesday by (*Wday_t*), Thursday by (*Thday_t*) and finally, Friday is represented by (*Fday_t*). Furthermore, I also included a dummy variable that was not included in the study by Edmans et al. (2007) called (*MC_t*). This variable takes a value of one if the stock market was closed on the day following a game played by the Dutch team and zero otherwise. The reason I included this variable is that the reaction from a positive or negative result might be different if the market is open the day following a game as opposed to when investors have to wait a couple of days to invest.

Table 3.3 Descriptive Statistics of the relevant control variables.

Variable	Mean	Std. dev.	Min	Max
Rwm	0.0003	0.0099	-0.1012	0.0810

Table 3.3 shows that *Rwm* has a mean of 0.0003 which signifies that the returns on the World market index showed a positive increase of 0.03% on average on a daily basis during the studied period. This also shows that the daily returns on the World market index were almost the same on average as the returns on the Dutch market. The minimum value it took during this time is -0.1012 meaning the most negative return on the World market was -10.12%. Meanwhile, the maximum value this variable has is 0.0810 which means that during the studied time the highest increase on the market was 8.1%. The variables for game results are excluded from the table since they are dummy variables and therefore not very informative.

CHAPTER 4 Method

This section is dedicated to the methods that I will use to test the hypotheses of this paper.

4.1 Hypothesis 1

To test my first hypothesis (H1): *A loss/win by the Dutch national team will have a negative/ positive relationship with Dutch stock market returns.,* I will look for significant correlation coefficients between the returns in the Dutch price index and the games won or lost by the Dutch national team, leading to the following regressions:

$$Rdm_t = \alpha + \beta_1 Ddw_{t-1} + \beta_2 Ddl_{t-1} + \beta_3 Rdm_{t-1} + \beta_4 Rwm_t + \varepsilon_t. \quad (1)$$

For regression (1) I will measure the Dutch stock returns (*Rdm*) with two control variables, Rdm_{t-1} which represents the returns on the Dutch index on the previous day to account for possible autocorrelation and Rwm_t representing the returns in the World market index on day t. The variables of interest $Ddw_{t-1} = 1$ if the Netherlands won a game at time t-1 and Ddl_{t-1}=1 if the Netherlands lost a game and at time t-1, for any other case they take the value of zero. Under the null hypothesis of wins and losses having no effect on Dutch returns, β_1=β_2 =0. Next, I will add more control variables and use the following regression:

$$Rdm_t = \alpha + \beta_1 Ddw_{t-1} + \beta_1 Ddl_{t-1} + \beta_2 Rdm_{t-1} + \beta_3 Rwm_t + \beta_4 \boldsymbol{Control\ Variables} + \varepsilon_t. \quad (2)$$

On regression (2) I added the control variable Rwm_{t-1} which takes the one day lagged value of the returns in the World market. I also added the dummy variable *MC*=1 if the stock market was closed the day following a game played by the Netherlands and *MC*=0 otherwise. Additionally, this regression also includes the control variables *Mday*, *Tuday*, *Wday*, *Thday* representing the days of the week. The variable Fday that represents Friday is not included in this regression since this is the reference category.

4.2 Hypothesis 2

In order to test my second hypothesis (H2): *A win or a loss by the Dutch national team in a World Cup match will have a stronger relationship with changes on the Dutch stock market compared to regular games.,* I will look for the correlation coefficients between the returns on the Dutch price index and the result of the games played by the Dutch national squad in the World Cup. After finding these coefficients I will perform an F-test to analyse whether the coefficients associated with World Cup results differ significantly from the ones found after regular games. I will start by performing the following regression:

$$Rdm_t = \alpha + \beta_1 Ddwwc_{t-1} + \beta_2 Ddlwc_{t-1} + \beta_3 Ddw_{t-1} + \beta_4 Ddl_{t-1} + \beta_5 \boldsymbol{Control\ Variables} + \varepsilon_t. \quad (3)$$

In regression (3), I included the variables $Ddwwc_{t-1}$ and $Ddlwc_{t-1}$ to obtain the coefficients of World Cup matches. I also added the variables Ddw_{t-1} as well as Ddl_{t-1} to obtain the coefficients associated with results on regular games played by the Dutch team. In a similar way as with my other hypothesis, I also included the control variables Rdm_{t-1} and Rwm_t. After that I included more controls which lead me to the following regression:

$$Rdm_t = \alpha + \beta_1 Ddwwc_{t-1} + \beta_2 Ddlwc_{t-1} + \beta_3 Ddw_{t-1} + \beta_4 Ddl_{t-1} + \beta_5 \boldsymbol{Control\ Variables} + \varepsilon_t. \quad (4)$$

For this regression, I used the same variables of interest as with regression (3) while including the control variables Rdm_{t-1} and Rwm_t. Additionally, I also added to my model the controls Rwm_{t-1}, *MC* and control variables for each day of the week. After running regression (4), I will then compare the coefficients associated with wins by means of an F-test in the following way:

$$\beta_1 = \beta_3. \quad (5)$$

Under the null hypotheses of no difference in coefficients, $\beta_1 = \beta_3$ while my alternative hypothesis suggests $|\beta_1| > |\beta_3|$. In a similar way, the way I will compare the coefficients associated with losses is with the following F-test:

$$\beta_2 = \beta_4. \quad (6)$$

Under the null hypotheses of no difference in coefficients, $\beta_2 = \beta_4$ while my alternative hypothesis suggests $|\beta_2| > |\beta_4|$.

CHAPTER 5 Results & Discussion

The model was estimated using Ordinary Least Squares (OLS). Additionally, the potential difference in coefficients was analysed by means of an F-test.

5.1 Relationship between Dutch results and their stock index returns

Table 5.1 Results of OLS regressions of Dutch index returns on Dutch games and control variables.

	Dutch index returns	
	(1)	(2)
Dutch win	-0.0017*	-0.0021**
	(0.0009)	(0.0010)
Dutch loss	-0.0002	0.0003
	(0.0018)	(0.0018)
Dutch index returns (t-1)	-0.0497***	-0.2441***
	(0.0096)	(0.0137)
World index returns	0.9839***	0.9813***
	(0.0128)	(0.1233)
World index returns (t-1)		0.3510***
		(0.1826)
Market Closed after game		0.0006
		(0.0014)
Monday		0.0004
		(0.0004)
Tuesday		0.0004
		(0.0004)
Wednesday		0.0006
		(0.0004)
Thursday		0.0004
		(0.0004)
Constant	0.0000	-0.0003
	(0.0001)	(0.0003)
Observations	4944	4944
R^2	0.5473	0.5791
Adjusted R^2	0.5469	0.5783

Note: Standard errors in parenthesis.
*p<0.1; **p<0.05; ***p<0.001

As discussed before, the dependent variable Rdm represents the returns in the MSCI Netherlands price index in percentages and my variables of interest namely $(Ddw)\ and\ (Ddl)$ take only a value of 0 or 1. For this reason, the way to interpret the found results is the following: If a variable of interest takes the value of 1, the variable Rdm changes by a percentage equal to the coefficient value of the variable

of interest on average. In a similar way, if the variable *MC*=1, *the* variable Rdm changes by a percentage equal to the coefficient of *MC* on average. Furthermore, when Rwm changes by 1%, Rdm changes by a percentage equal to the coefficient value of Rwm on average. Finally, if a dummy variable representing a day of the week takes a value of 1, Rdm will change on average by a percentage equal to the coefficient taken by the day of the week, compared to Fridays. Table 5.1 shows the results obtained for OLS model (1) including only two control variables and model (2) adding additional controls. Given that both models show not significant relationship between the Dutch index price and my variables of interest, there is no evidence to support Hypothesis 1 which stated that a win/loss by the Dutch national team would represent higher/lower returns on the Dutch stock market. Model (2) has an R-squared of 0.58 meaning the variables in that model explain around 58% of the total variance in the Dutch price index. Regression (1) has an R-squared of about 0.55 meaning that the model excluding most of the control variables explains about 3% less of the variance in the Dutch price index. Model (1) indicates that a loss by the Netherlands on an international game is correlated with a decrease of 0.02 percent returns on the Dutch price index. However, the p-value of the regression is larger than 5% indicating that this relationship is not significant. Furthermore, model (2) can be interpreted as a loss by the Netherlands being correlated with a decrease of 0.03 percent on the Dutch price index returns. However, this relationship is also not significant since the p-value in this regression remains larger than 5%. Surprisingly, model (2) shows that a win by the Netherlands is significantly correlated with a decrease of 0.21% on the Dutch index return. Additionally, all control variables have the expected sign and magnitude. The change on the world index as well as its lagged value has a positive effect, previous returns on the Dutch index has a negative effect. Moreover, all the variables representing a day of the week used in the model have an insignificant positive coefficient meaning no interpretation can be made from them.

My results showed that a Dutch loss on an international game has no significant effect on the Dutch price index for the period I studied. This finding is then in line with previous research by Klein et al. (2009) but different from the study I replicated by Edmans et al. (2007). Given that I tried to keep my variables consistent, I believe it is possible that while losses on international games had an effect on investment decisions in the past this relationship no longer holds. It is also possible that results vary depending on the region analysed given that some countries have a stock market which might have higher correlation with the global market. This higher correlation could then translate in the stock price of a country being determined in large part because of international investor sentiment which would be unaffected by a loss of a particular country. Another possible reason for a change in the results could be a decrease in home bias, given that the original study by Edmans et al. (2007) argued this was an important factor that led to their findings. Their reasoning was, as discussed before, that a loss by a national squad in a game would impact the national stock returns given that a high percentage of the stock owners would belong to this same country and would respond to it. However, if home bias is not as strong as before, it might be the case that the results on international games lose their effect on stocks.

My results show a negative relationship between wins in football matches by the Dutch national team and the Netherlands price index. This finding is different from both the studies by Klein et al. (2009) as well as the research by Edmans et al. (2007) who found no relationship between these variables. A possibility for the difference in my results could be the timeframe studied in my research. Given that there have been two major recessions in the time I studied, the results could potentially be affected by big decreases in the price index during the recessions which could happen to take place on the same day as Dutch wins on international games. An additional possible reason why my results ended up being different than what I expected could come from the fact that I slightly changed the approach from previous studies. Edmans et al. (2007) as well as Klein et al. (2009) included in their studies only the games that were considered hard to win excluding matches against squads where it would be easy to expect Netherlands to win. I decided against doing this and included all matches the Netherlands won on official tournaments given that I thought there were not enough observations during this timeframe if the "expected" wins were excluded. As a result, I might have included observations that had possibly little or no relationship with stock prices while also adding instances when the price index might have decreased for reasons outside my model.

5.2 Relationship between Dutch results on the World Cup and their stock returns

Table 5.2 Results of OLS regressions of Dutch index returns on Dutch results on World Cup games and control variables.

	Dutch index returns	
	(1)	(2)
Dutch World Cup Win	-0.0001	0.0004
	(0.0024)	(0.0023)
Dutch World Cup Loss	-0.0093**	-0.0107**
	(0.0049)	(0.0047)
Dutch win	-0.0017	-0.0022**
	(0.0010)	(0.0011)
Dutch loss	0.0013	0.0021
	(0.0020)	(0.0020)
Dutch index returns € (t-1)	-0.0495***	-0.2443***
	(0.0096)	(0.0137)
World index returns €	0.9841***	0.9815***
	(0.0128)	(0.0123)
World index returns € (t-1)		0.3516***
		(0.0183)
Market Closed after game		0.0006
		(0.0004)
Monday		0.0004
		(0.0004)
Tuesday		0.0004
		(0.0004)
Wednesday		0.0006
		(0.0004)
Thursday		0.0004
		(0.0004)
Constant	0.0001	-0.0003
	(0.0001)	(0.0003)
Observations	4944	4944
R^2	0.5476	0.5796
Adjusted R^2	0.5471	0.5786

Note: Standard errors in parenthesis.
*p<0.1; **p<0.05; ***p<0.001

The variables in this table can be interpreted in a similar way as the ones analysed in Table 5.1 Table 5.2 shows the results obtained for OLS model (1) which contains the same two control variables as before, namely, the lagged change in the Dutch price index and the change in the world index while model (2) includes additional controls. Model (2) has an R-squared of 0.58 meaning the variables in that model explain around 58% of the total variance in the Dutch price index. This means that the models

used on Table 5.1 explains almost the same percentage of variance in the price index as this one, which stands to reason given that the controls used are the same. Regression (1) on the other hand has an R-squared of about 0.55 signifying that this model is able to explain 3% less variance in the Dutch market returns than model (2). Model (1) indicates that a win by the Netherlands in a World Cup match on an international game is correlated with a decrease of 0.01% on the Dutch price index, but this relationship is not significant, and no interpretations can come from this coefficient. Meanwhile, a loss by the Dutch squad in a World Cup Game is related with a decrease of 0.93% in the index returns, furthermore this relationship is significant to the 5%. Additionally, wins and losses by the Dutch team in regular games have an insignificant relation to changes in Dutch returns. The way to interpret model (2) is as follows: a win by the Netherlands in a World Cup game has an insignificant correlation with an increase of 0.04% returns on the Dutch price index. On the other hand, a loss by the Dutch team in the World Cup has a negative relationship leading to a 1.07% decrease on the Dutch MSCI price index on average. The corresponding p-value is smaller than 5%, indicating that the effect is significant. Additionally, Dutch wins on regular games has a significant negative relationship to returns in the Dutch market. On the other hand, Dutch losses on regular games has an insignificant relationship to changes in the Dutch market. Meanwhile, all control variables have the expected sign and magnitude. The change on the world index as well as its lagged value have a positive effect while the previous change on the Dutch index has a negative effect. Additionally, all the variables representing a day of the week used in the model have an insignificant positive coefficient meaning no interpretation can be made from them. Additional robustness tests are shown in Appendix A (Table A.1). The same model was estimated while removing the 5% more extreme positive and 5% more extreme negative returns on the Dutch market to make sure that the relationship found is not influenced by possible large outliers. The reported results remained significant against these alternative specifications. With the coefficients found in Table 5.2 I was able to perform the F-tests required to test my hypothesis.

Table 5.3 Results of F-test on difference in Dutch World Cup wins coefficient and regular game wins coefficient.

Coefficient	df1	df2	F	p-value
Dutch World Cup wins	1	4931	0.81	0.3668
Dutch wins	1	4931		

Table 5.4 Results of F-test on difference in Dutch World Cup losses coefficient and regular game losses coefficient.

Coefficient	df1	df2	F	p-value
Dutch World Cup losses	1	4931	4.85	0.0276
Dutch losses	1	4931		

Table 5.3 shows that the coefficient of Dutch World Cup wins obtained from regression (3) is not statistically different from the coefficient shown by Dutch wins on regular games. Table 5.4 on the other hand shows that the coefficient of Dutch World Cup losses obtained from regression (3) is indeed statistically larger in absolute value from the coefficient corresponding to Dutch losses on regular games. Given that the coefficient for wins in World Cup games do not show a significant difference from regular wins I have no evidence to support my hypothesis of World Cup wins having higher effects on the Dutch stock market. On the other hand, given that the coefficient for World Cup losses is statistically larger in absolute value when compared to regular losses I do not reject the hypothesis of World Cup losses having higher effects on the Dutch stock market.

My results showed that losses for the Netherlands in World Cup games are indeed correlated with higher changes in the Dutch price index compared to losses on regular games during the period I studied. This finding is similar to previous research by Ashton et al. (2003). This shows that even if investors might behave rationally nowadays after regular matches, they might still show irrational investing behaviour following losses in World Cup matches. Even if home bias might have decreased in recent years as I suggested before, World Cup games are probably followed by such a large part of the population that they appear to still be able to influence stock returns. Additionally, World Cup wins show no statistical effect on stock returns which would then be in line with the studies by Klein et al. (2009) as well as the research by Edmans et al. (2007). These results are then different to the ones I found in Table 5.1. I believe a possible reason for this might come from the fact that in World Cup games only the teams that were able to qualify are allowed to play which makes the matches harder to predict since the level of teams increases in relation to qualifying games. For this reason, I believe that by analysing only World Cup wins, my model might be better aligned with the one used by Edmans et al. (2007) which might explain why my results suddenly also become consistent with the ones found in their research.

CHAPTER 6 Conclusion

In my thesis I focused on the influence of results on international football results on the stock returns of a country. Previous research found that losses on an international game were significantly correlated with a negative effect on stock returns. Additionally, previous studies had found that this correlation presented a higher magnitude when the games played by a national squad were part of a direct elimination tournament. However, previous findings studied different timeframes and it remained unclear whether they remained consistent today. Additionally, there have been relevant recessions in recent times which affected investing behaviour and could have an effect on present results. Therefore, I made the aim of my research to analyse this relationship in recent years and decided to use the Netherlands as the country of my study since it had been used in previous research and it is a nation with a strong football culture. For the previously stated reasons, the question that was studied in my dissertation was: How does the result of the Dutch national team in an international football match affect the Dutch stock returns?

To answer my research question, I obtained the closing prices of the Morgan Stanley Capital International (MSCI) Netherlands price index from January 1st, 2004, until December 31st, 2022, from Datastream. Additionally, I gathered the results of 147 games played by the Netherlands national squad during the same period on international competitions excluding friendly matches. The way in which I performed my research was by use of two multiple regressions where Dutch stock returns was treated as the dependent variable while wins and losses on international games were treated as my variables of interest while adding additional control variables. Both models showed no significant relationship between the MSCI Dutch index and Dutch losses. Additionally, I used two multiple regressions where Dutch stock returns was treated as my dependent variable while wins and losses by the Dutch squad on World Cup games and regular games were treated as my variables of interest. After performing these regressions, I performed an F-test to look for a statistical difference in the regression coefficients. In this case, the tests showed no statistical difference in the effects of World Cup wins and regular game wins on the Dutch stock returns. My tests also showed a larger relationship between World Cup losses by the Dutch team and Dutch stock returns when compared to losses on regular games.

My study therefore concludes that international football results can indeed have an effect on stock returns of a country nowadays. However, only losses appear to influence stock returns, showing a negative effect, and this effect is only present on important games which are usually played in relevant tournaments like the World cup. This suggests that results found by previous studies of investors acting in an irrational way following losses still holds on elimination tournaments but no longer holds for the rest of games. My study also concludes that wins on international games are shown to have no positive effect on the stock returns of a country. This in turn suggests that investor behaviour remains unaffected by international wins as was found on some previous studies. These findings pose an interesting

discovery for investors as my study shows that following World Cup losses, index prices will be lower. This in turn could pose an opportunity for arbitrage if an investor were to buy stock from a national index the day following a loss.

A potential limitation of my study is the fact that not many observations exist for World Cup losses. However, a national squad will probably have no more than one or two losses during a World Cup given that after a loss they are likely eliminated from the competition. This makes it difficult to analyse losses in this competition given the fact that they are played only once every four years and even if a longer timeframe were to be used, the number of observations would remain low. Nevertheless, a possible solution for future studies could be to add countries with similar characteristics to their study and in this way check the robustness of these findings.

An additional limitation of this study is that there is no way of measuring the change of the stock returns instantly after a loss and having to wait until the following day may cause some of the effects to change or reduce. Nevertheless, future studies could try to come up with a way of measuring these changes in a more efficient way. Finally, it could be interesting to extend the research to see if World Cup losses have spill-over effects which influence stock returns from countries that might not be qualified to the World Cup but follow a specific neighbouring country.

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APPENDIX A

Table A.1 Results of OLS regressions of Dutch index returns on Dutch results on World Cup games removing 10% most extreme observations and control variables.

	Dutch index returns	
	(1)	(2)
Dutch World Cup Win	0.0008	0.0012
	(0.0019)	(0.0020)
Dutch World Cup Loss	-0.0083***	-0.0093**
	(0.0041)	(0.0040)
Dutch win	-0.0016	-0.0018*
	(0.0008)	(0.0009)
Dutch loss	0.0003	0.0009
	(0.0017)	(0.0017)
Dutch index returns € (t-1)	-0.0265***	-0.1517***
	(0.0080)	(0.01167)
World index returns €	0.7061***	0.7045***
	(0.1071)	(0.0109)
World index returns € (t-1)		0.2259***
		(0.0155)
Market Closed after game		-0.0001
		(0.0012)
Monday		0.0004
		(0.0003)
Tuesday		0.0001
		(0.0003)
Wednesday		0.0004
		(0.0003)
Thursday		0.0003
		(0.0003)
Constant	0.0002**	-0.0001
	(0.0001)	(0.0002)
Observations	4944	4944
R^2	0.4694	0.449
Adjusted R^2	0.4687	0.448

Note: Standard errors in parenthesis.
*p<0.1; **p<0.05; ***p<0.001