The Cristiano Ronaldo rape allegation scandal
-
Financial implications for his market environment

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Dissertation written under the supervision of Professor Geraldo Cerqueiro

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Abstract

This dissertation aims to measure the financial impact of Cristiano Ronaldo's rape allegation scandal on his sponsors and his team Juventus Turin. It applies an event study methodology by using stock market data to test whether the event caused losses to Ronaldo's market environment. In order to take into account the finding of previous literature that athlete-product congruence is influencing the customers' perception of an endorsed product, this dissertation analyses the market environment of Ronaldo by allocating the companies into different groups. This work reveals significant negative cumulated abnormal returns for the sport-related group in the course of the event. Juventus Turin had the most negative performance in this sample with cumulated abnormal returns of -25,2%. For all other groups, such a relation could not be identified. Overall, the financial loss to the sport-related market environment of Ronaldo amounted to $ -20,5 billion. In contrast, neither a study on the infidelity scandal of Tiger Woods nor on the doping scandal of Floyd Landis identified a significant negative impact. These findings, thus, open up a new field of research for the area of athlete endorsement.

Due to the increased importance of social media on the effectiveness of athlete endorsement, this dissertation additionally analyses the development of followers on Ronaldo's Instagram account in the course of the event. To do so, it conducts a difference-in-difference approach, in which Neymar and Messi serve as the control group. However, no effect of the rape allegation scandal on Ronaldo's Instagram account could be revealed.

Title: The Cristiano Ronaldo rape allegation scandal – Financial implications for his market environment
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Abstrato

Esta dissertação tem como objetivo determinar o impacto financeiro da alegada violação de Cristiano Ronaldo nos seus patrocinadores e na sua equipa, Juventus Turin. Aplicou-se a metodologia de estudo de eventos, utilizando dados do mercado de ações para testar se o evento causou danos no mercado envolvente de Ronaldo. De forma a ter em conta as constatações da literatura anterior onde a congruência atleta-produto influencia a perceção dos clientes sobre o produto endossado esta dissertação analisa a influência do mercado envolvente do Ronaldo alocando as empresas em diferentes grupos. Este trabalho revela retornos anormais cumulativos negativos significativos para o grupo desportivo no decurso do evento. Juventus Turin teve o desempenho mais significativo da amostra com retornos anormais cumulativos de -25,2%. Para todos os outros grupos, tal relação não foi constatada. No geral, as perdas financeiras para o mercado desportivo relacionado com Ronaldo ascenderam a $-20.5 biliões. Em contraste, nem no estudo do escândalo de infidelidade do Tiger Woods nem no caso de doping de Floyd Landis foi identificado qualquer impacto negativo significativo. Estes resultados abrem uma nova área de pesquisa no campo de endosso de atletas. Devido à crescente importância das redes sociais na eficácia do endosso dos atletas, esta dissertação, também analisa o desenvolvimento dos seguidores da conta de Instagram no decorrer do evento. Assim, realizou-se uma abordagem de diferenças em diferenças onde Neymar e Messi servem como grupo de controlo. No entanto, não foi encontrado qualquer efeito da alegação de violação nos seguidores do Instagram de Ronaldo.

Título: O escândalo da alegada violação do Cristiano Ronaldo – Implicações financeiras para o seu mercado envolvente
Autor: Peter Kleinhans
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ACSAR	Average cumulative standardized abnormal return
AR	Abnormal return
CAR	Cumulated abnormal return
CMRM	Constant mean return model
MRM	Market return model
SAR	Standardized abnormal return

1 Introduction

Over the last decades, the commercialisation potential of the sports industry has attracted growing attention. This led to a rising interest of companies in sport sponsoring, placing both sport teams and athletes at the center of their marketing strategies. In particular, the use of athlete endorsement has proven valuable for companies. In this context, companies aim to transfer the positive association that customers have with a particular athlete to their brand (Carlson and Donavan 2008). The effectiveness of this marketing tool additionally benefited from the increasing usage of social media (Cunningham and Bright 2012). Consequently, athletes sign more and more multimillion-dollar endorsement deals. For instance, Roger Federer earned $65 million of his $78 million income through various endorsement contracts. That made him the best paid athlete on earth in 2017 (Forbes 2018).

'They're humans. When you sign on to a celebrity, you sign on to the whole package - The good, the bad, and the ugly' Becky Madeira of PepsiCo (Conrad 1995).

The benefits of athlete endorsement are, however, not risk-free. Due to the high degree of popularity of athletes, scandals are often revealed and through the internet quickly distributed to a large audience. In addition to harming the athlete's reputation, misbehaviour can also represent a risk to the endorsed companies (Till and Shimp 1998). Two studies in literature particularly examined the economic impact of such a scandal on the sponsoring environment of the athlete. Hood (2012) investigated the infidelity scandal of Tiger Woods. Contrary to the suggestion of previous research, Tiger Woods' sponsors did not suffer from significant negative stock performance. Complementary, Leeds (2010) tested the impact of Floyd Landis' victory at the Tour de France 2006 as well as the disclosure of his use of doping in stage 17 on his sponsor Phonak. In this case, the negative news even had a positive impact on Phonak's stock performance. Therefore, these findings create demand to further investigate whether athlete endorsement is risking the sponsors' stock profitability in case of an athlete scandal.

Recently the Cristiano Ronaldo rape allegation scandal was revealed by 'Der Spiegel' on September 29th 2018 and made headlines around the world. The intense reactions in the media regarding the accusation gave incentive for this dissertation which examines whether the market environment of Cristiano Ronaldo was economically impacted by the scandal. The fact that Ronaldo is considered one of the best footballers of all times and the fact that his extraordinary performance made him one of the best paid sport stars on earth make him a suitable candidate for the examination.

To investigate whether the event affected the stock prices of his club Juventus Turin and the companies endorsed by Cristiano Ronaldo, this dissertation applies the event study methodology. In order to evaluate the stock performance, this dissertation conducts parametric and non-parametric tests, where the constant mean return model (CMRM) and market return model (MRM) serve as benchmark to measure 'normal' returns. These tests allow investigating whether abnormal returns as well as cumulative abnormal returns are significantly different from zero (McWilliams and Siegel 1997, p. 629). For the non-parametric tests, the generalized sign test and the Wilcoxon signed-rank test serve as a robustness check.

The identified endorsement deals of Cristiano Ronaldo are divided into different categories in order to differentiate the findings. The allocation is based on the following findings of the literature: Kim and Na (2007, 23) confirmed in their study that customers favour the product endorsed by the athlete which best matches the athlete-product congruence (sport shoes vs. perfume). Additionally, the topicality of the endorsement deal plays an important factor in determining whether investors still perceive the endorsed brand with Ronaldo.

The three main categories applied in this dissertation are thus current sport-related, current non-sport-related and expired endorsement deals. Further, endorsed companies with a parent company, where only the latter is listed on the stock market, are grouped to the category parent companies.

It is expected that currently endorsed companies will suffer negative significant abnormal returns during the event window. This work expects the strongest reaction for the sport-related market environment, due to the higher athlete-product congruence. On the contrary, for the expired endorsement deals as well as the endorsed companies that have a parent company, no abnormal returns are assumed to be identified. This assessment is based on the fact that for both groups it is unlikely that investors still perceived the brand as represented by Ronaldo.

Due to the increasing importance of social media for the area of celebrity endorsement, this dissertation is additionally analysing the development of Instagram followers of Cristiano Ronaldo in the course of the event. For the analyses, this dissertation conducts a difference-in difference approach. The high activity of endorsed companies on social media leads to the assumption that the development of Instagram followers will show the same pattern as the parametric tests of the sport-related endorsers.

The dissertation is structured as follows: In the next section, the theoretical background for this dissertation is set. Section three presents the event of the rape allegation scandal and is further presenting Cristiano Ronaldo's market environment. In section four, the methodology applied to analyse the stock performance of Ronaldo's market environment will be explained.

Afterwards, the results are presented and the findings of this dissertation are discussed. Finally, the conclusion is summarising the dissertation, showing its limitations as well providing suggestion for further research.

2 Literature review

The literature review illustrates the recent trends in sports sponsoring and critically reviews the results of previous studies. Furthermore, provides the theoretical background to the event study methodology used for this thesis.

2.1 Endorsement as a marketing strategy

It is not a recent marketing phenomenon to use celebrity endorsement as a tool to advertise a company's product. The first celebrity endorsement for a product dates back to the late 19th century, when Lillie Langtry, a British-American socialite and actress, was advertising for Pear's Soap (Hicks 2012, p. 184). According to Shimp and Andrews (1997, p. 290), at the end of the 20th century, 25 percent of all commercials broadcasted in the US included a celebrity.
This form of marketing communication has constantly developed over the last decades and extensive research has been conducted on its effectiveness. Many studies have examined the impact on stock markets as well as the influence on consumers' perceptions. Agrawal and Kamakura (1995) conducted an event study analysing the impact of 110 announcements of celebrity endorsement contracts on stock returns. They identified a positive relation between the announcement and the firm's profitability, thus, confirming celebrity endorsement as an advantageous advertisement campaign. More recently, Chung, Derdenger, and Srinivasan (2013) investigated the influence of endorsement on product sales by examining how Tiger Wood's engagement with Nike effected the sales of their golf balls. Their study concluded that the engagement had a positive effect.
As this thesis concentrates solely on the rape allegation scandal of Cristiano Ronaldo, the following section will present athlete endorsement as a sub-form of celebrity endorsement in more detail.

2.2 Benefits of athlete endorsement

The commercialisation of sport is leading to an ever increasing interest in sport sponsoring. This development is not only due to increasing numbers of spectators of sport events and the greater range of TV broadcast, but also influenced by the presence of sport stars on social media (Cunningham and Bright 2012, p. 73). Hence, investment opportunities for companies occur in different areas of sport, such as organisations (e.g. Juventus Turin), in sport events (e.g.

Olympic Games) as well as in athletes (e.g. Cristiano Ronaldo) (Farrelly and Questers 2005, p. 56).

This thesis takes a closer look at the impact of athlete endorsement using the example of Cristiano Ronaldo. When discussing this topic, it is important to understand the importance of the charism that an athlete radiates with an endorsement. Research found that the characteristics of an athlete, such as attractiveness, expertise and trustworthiness are major drivers for a successful endorsement (Erdogan 1999, p. 297). In addition, a key factor for a successful athlete endorsement is to give the customer the impression that the athlete really identifies with the product (Silvera and Austad 2004, p. 1509). Using social media, sports stars can provide exactly these authentic insights. It also allows both the athlete and the brand to start building a relationship with the customer (Cunningham and Bright 2012, p. 73). Nevertheless, the social media presence needs to display the described conditions. For example, Kim and Na (2007, p. 23) confirmed in their study that customers favour the product endorsed by the athlete which best matches the athlete-product congruence (sport shoes vs. perfume) and, thus, confirm the established concept of the so called 'match-up' hypothesis for the area of sport (Ohanian 1991). Due to the positive experience of athlete endorsement, companies are spending around 1.6$ billion every year (with a growing tendency) on this strategy. The fact that 70% of this money is spent only on 100 athletes, underlines the importance of the publicity and popularity of the endorsers (Lawrence 2013).

Sport offers multiple endorsement opportunities connected to athlete endorsement. Brands are especially interested in an interaction of the athlete with his/her team (e.g. Messi representing FC Barcelona, Cristiano Ronaldo acting as the face of Real Madrid for many years). Similarly, Carlson and Donavan (2008) reveal in their study that athlete endorsement is not only influencing the customers' intention to purchase the endorsed product but also increases the fan's level of identification with the respective team. Therefore, this thesis is analysing the impact of the Cristiano Ronaldo's rape allegation scandal on both his sponsors and Juventus Turin, the club Ronaldo is playing for. On a similar note, Kim and Cheong (2011) confirm the 'match-up' hypothesis and find evidence that participants perceive a brand more positively when the participants ethnicity matches the one of the athlete (in contrast to a discrepancy).

Nevertheless, it must be stated that the described benefits of athlete endorsement are not risk-free. The potential downsides will be presented in the following section.

2.3 Risks of athlete endorsement

As previously described, companies hope to benefit from athlete endorsement by transferring the positive association that customers have of a certain athlete to their brand and/or to their product. The following quote highlights that firms also need to take into consideration the possibility that an endorser is involved in an undesirable event, which can have a harmful effect for the spokesperson and for the company.

'They're humans. When you sign on to a celebrity, you sign on to the whole package - The good, the bad, and the ugly.' Becky Madeira of PepsiCo (Conrad 1995).

Till and Shimp (1998) analysed the impact of negative information on brand sympathy and found evidence of the negative influence of bad news on brand perception. Nevertheless, a differentiation has to be made between two types of undesirable events, the ones an athlete can be blamed for and the ones where the occurrence of negative information is not their own fault. In light of this, Louie, Kulik and Jacobsen (2001) investigated how the stock performance of a firm reacts when their endorser is involved in a negative event. Their results indicate that the stock market performance depends on the extent to which the endorser can be blamed for the negative publicity. They discovered that behaviour, which can be considered as culpable, has negatively affected the sponsor's stock performance. On the contrary, if the event is not caused by poor behaviour of the celebrity, such as an injury, the event actually increases the company's value. The study of Louie and Obermiller (2002) incorporated these finding and examined whether a sponsor should continue the endorsement agreement or if it is favourable to revoke the relationship. In cases of gross culpability, they reveal that the company is better off to void the contract, whereas for low levels of culpability it is better to maintain the relationship.
The rape allegation scandal of Cristiano Ronaldo can be classified as 'coarse fault' and thus, this thesis is focusing in the following on literature dealing with this classification. In order to examine sport scandals, literature differentiate between on-field (performance related) and off-field transgressions. For instance, doping or game manipulation are performance-related transgressions, whereas actions that are unrelated to sport, such as extramarital affairs, murder or drug consumption are identified as off-field transgressions (Fink et al. 2009, p. 143).
Yoon and Shin (2017) analysed the influence of the transgression type on the sponsoring brand. Their results indicate that off-field misbehaviour is affecting the sponsor more negatively than performance-related transgression. However, studies could not confirm a negative impact of on- and off-field transgressions on the economic valuation of sponsors.

Hood (2012) investigated the infidelity scandal of Tiger Woods (off-field transgression) by using the event study methodology: He found, contrary to the suggestion of previous research that the sponsors of Tiger Woods did not suffer from significant negative stock performance during the event. An event study by Leeds (2010) tested the impact of Floyd Landis' victory at the Tour de France 2006 as well as the disclosure of his use of doping (on-field transgression) in stage 17 on his sponsor Phonak. The stock performance of Phonak was not immediately affected, however, Leeds (2010) discovered a significant positive cumulative abnormal return of the stock in the course of the events. These results provide further incentives to investigate whether athlete endorsement is risking the sponsors' stock profitability in the case of a scandal. Only a few studies tried to identify how athlete transgression can have a positive influence on the brand evaluation. Lee, Kwak and Moore (2015) investigated how customers' moral reasoning approaches are affecting the judgement of an athlete transgression. Their results reveal that two moral reasoning strategies are in fact increasing the brand evaluation and positively affect the customers' purchase intention: On the one hand, moral decoupling, where customers separate the immorality judgment from the athlete's performance. And on the other hand, moral rationalisation, which means that the customer tries to justify immoral actions as less blameworthy and thus continue to support the athlete (Bhattacharjee et al. 2013, p. 1168). Furthermore, many studies are overlooking how the company reactions during the scandal are impacting the brand. Carrilla et al. (2013) identified three different dimension one should consider when analysing the effect of a negative event on the brand: The communication of the news and the media response, the statement of the athlete and the response of the brand. This structure will be applied to examine the rape allegation scandal of Cristiano Ronaldo.

2.2 Event study methodology

In the previous section, relevant studies for this thesis were presented. In particular, the Tiger Woods infidelity scandal as well as the Floyd Landis case have provided the theoretical basis for this thesis. Both cases used event study methodology, which will also be used as a method to analyse the rape allegation scandal of Cristiano Ronaldo. Therefore, in this section the theoretical background of event studies will be reviewed.

Economists regularly need to examine how an economic event is affecting the value of a firm. By using data from financial markets, an event study is a method, which can measure the impact of an event on a firm's stock price. The idea is to identify whether the event causes an "abnormal" stock price effect and to conclude the significance of the happening (MacKinlay 1997, p. 13).

Event study methodology has been applied and developed for a long time, starting with James Dolley (1933), who investigated the impact of stock splits on stock prices. However, the study conducted by Fama et al. (1969) has shaped the basic way of how an event study is implemented until today. Fama et al. also tested the relation between stock splits and the adjustment of common stock prices, though controlling for confounding events and removing general stock market prices. This gave an impulse to follow a set of assumption when applying event study methodology. In the aftermath, researcher only developed modifications of the method (MacKinlay 1997, p. 14).

According to McWilliams and Siegel (1997), event studies have to be based on three assumptions in order to be able to identify abnormal returns: Market efficiency, isolation of confounding effects and unanticipated event.

The market efficiency assumption is of high importance for the use of the event study method as financial markets should directly reflect the impact of an event. Only in that case it makes sense to measure whether the event is causing abnormal returns (McWilliams and Siegel 1997, p. 630). On this basis, Benston (1982) is highlighting the advantage of event studies using stock market data compared to accounting-based procedures. He criticises that accounting-based measures are subject to manipulations, whereas stock prices are assumed to be able to directly incorporate new market information (Benston 182, p. 165).

In order to be certain that an event really causes stock price changes, researchers need to isolate the effect of an event. This is necessary, as there might be other events overlapping with the time of the studied event. These are called confounding event and can also influence the financial performance of a company (McWilliams and Siegel 1997, p. 634).

In addition, the studied event needs to be an unanticipated event. It is important that the market did not have previous access to the event information. This assumption is, thus, based on the market efficiency assumption, reflecting the importance that stock market reactions can only be related to the announcement when traders receive the event information on the announcement day (McWilliams and Siegel 1997, p. 633f).

In addition to the presented assumptions, McWilliams and Siegel (1997) also explain the necessity of following only a few criteria in order to set up a successful event study. They highlight that one needs to be careful with the sample size as the used test statistics are subject to the assumption of a normal distribution, which is linked to large samples (McWilliams and Siegel 1997, p. 634). Furthermore, the use of non-parametric tests, a supplement to parametric tests, is proposed as an alternative because possible outliers might influence the sample. Hence, non-parametric tests serve as a protection (McWilliams and Siegel 1997, p. 635). Lastly, Brown

and Warner (1985) point out that the definition and length of the event window is a crucial determinant. The wrong choice of the time window can lead to confounding events and incorrect conclusions.

In the literature various approaches have been discussed on how the event study can be applied to the calculation of normal returns for the event period, ranging from basic constant mean return models to more sophisticated approaches. MacKinlay (1997, p. 17) states that the gain of more complex models is limited. In the section "methodology" of this dissertation it will be explained in more detail which models are chosen to analyse the rape allegation scandal of Cristiano Ronaldo.

3 Market environment and event overview

In this section, the brand Cristiano Ronaldo will be presented, and his endorsement activities will be related to the presented literature from section two. Furthermore, the rape allegation scandal will be introduced and starting points for the financial analysis of the event will be identified.

To begin with his sport performance, Cristiano Ronaldo is considered one of the best footballers of all time. Of all his successes, the following are particularly noteworthy: Winning five times the Ballon D'Or for being the best footballer in the world (equal only to Messi in this regard), leading his teams to five champions league titles and leading the Portuguese national team as the captain to win the UEFA European Championship in 2016 (the first international title in Portugal's football history) (transfermarkt 2019a; transfermarkt 2019b). Ronaldo's extraordinary performance is also reflected in his earnings, making him one of the best-paid sport stars on earth (Badenhausen 2018).

However, his revenues not only result from his football activities but also from various endorsement deals. According to Forbes (2018), Ronaldo earned $108 Million in 2018, resulting from his football salary, endorsement contracts and the income from his CR7 brand (Badenhausen 2018). In connection to the findings of the literature review, Ronaldo's attractiveness as an athlete endorser is due to his immense social media reach, being the most followed person on Instagram since October 2018 (Lawless 2018). Visible on his Instagram profile (in May 2019), Ronaldo has 167 million followers, which enables not only him, but also his sponsor to build a relationship with their customers. This confirms the literatures with the finding that the proposed power of social media presence is an important factor for the success of athlete endorsements (Cunningham and Bright 2012, p. 73). Kenmare (2018) confirms the

sponsors' enormous willingness to pay for athlete endorsement by revealing that Ronaldo can demand approximately $750k per posting that includes an ad-based picture.

Ronaldo's market environment is complemented by his representation ability for his teams and, therefore, corresponds to the findings of Donavan (2008, p. 154) that athlete endorsement is positively affecting the fans identification for the represented team. For many years, Ronaldo was the face of Real Madrid, before being transferred to Juventus Turin in summer 2018. This transfer highlights Ronaldo's marketing power. According to the KMPG Football Benchmark (2018, p. 5), Juventus has good arguments to believe that the paid transfer fee will pay off easily. Identified areas that they can monetize on are their increasing social media presence, greater attraction to sponsors, growing income from merchandise such as shirts and the hope to generate higher income due to greater sporting success. The KPMG Football Benchmark (2018, p. 15) also points out that currently 40% of Juventus's partners are local and the transfer opens new possibilities to bring more international partners on board (Table 1 in Appendix A). In the following graph, the stock market performance of Juventus Turin is illustrated for the time window of the transfer announcement to Juventus and shows the immense market power of Ronaldo.

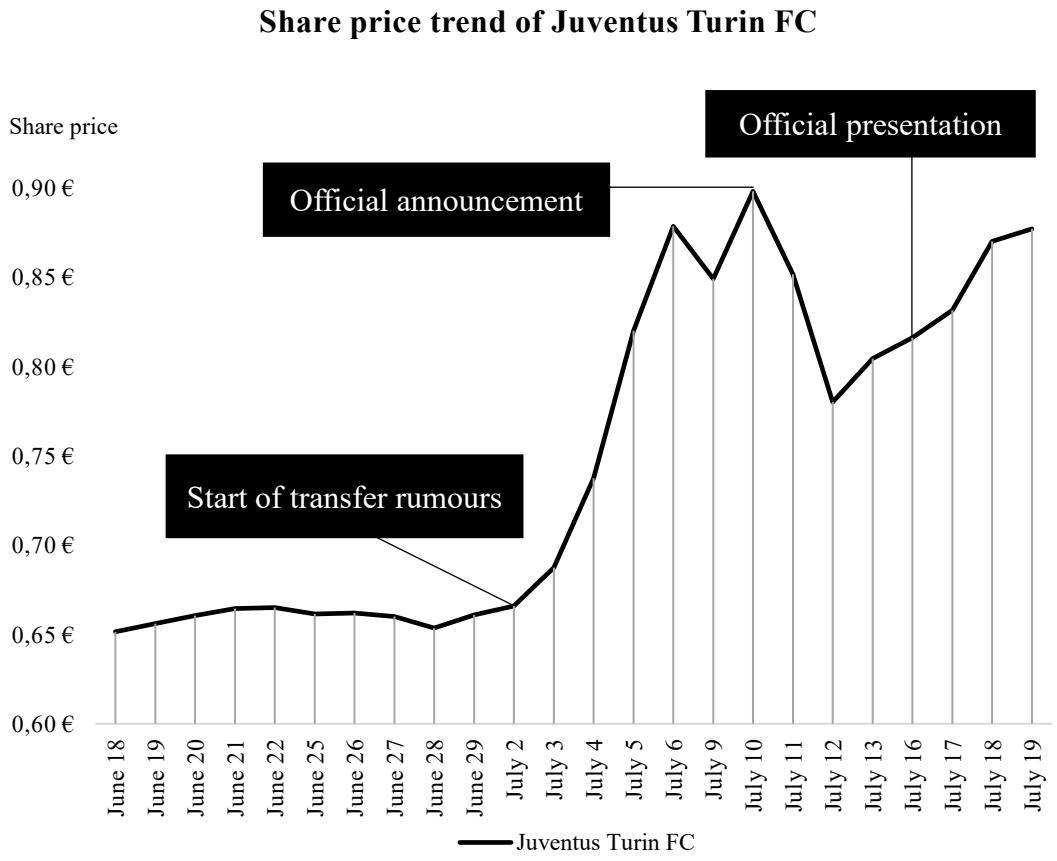

Figure 1: This figure presents the share price development of Juventus Turin FC around the transfer announcement of Cristiano Ronaldo being transferred from Real Madrid to Juventus Turin FC.

All mentioned arguments underline the value of Ronaldo for his sponsors, Juventus Turin and his own brand CR7.

However, in late September 2018 'Der Spiegel' published the story of Kathryn Mayorga, who accused Ronaldo of raping her in Las Vegas in June 2009. Along the report, 'Der Spiegel' also published documents, including an out-of-court agreement between Ronaldo and Mayorga to not discuss the incident in public. This agreement was negotiated by Ronaldo's lawyers in January 2010 (Der Spiegel Staff 2018). In the days following the publication, the news made headlines around the world and the Las Vegas Police department reopened the case (BBC 2018). Ronaldo denied the allegations on his social media platforms, however, his two biggest sponsors, Nike and Electronic Arts, expressed their concerns regarding the allegations in public newspapers (Fares 2018). In addition, the coach of the Portuguese National Football team announced that Ronaldo would not be considered for the national team at least for the rest of 2018 (Garcia 2018). As a reaction to all the accusations, Ronaldo's lawyers claimed that the report and the documents of 'Der Spiegel' are a made-up story (MacInnes 2018). Due to the immense reports and reactions, the following timeline is presenting the main points in the timeline of the rape allegation scandal in chronological order.

Timeline of the rape allegation scandal

Date	Information
13/06/2009	Kathryn Mayorga contacted the Las Vegas police about the rape, though did not identify Cristiano Ronaldo by name
12/01/2010	Agreement to not discuss the incident, Ronaldo's lawyers sign an out-of-court agreement with Mayorga and Ronaldo paid $375k to Mayorga
29/09/2018	Mayorga revealed her identity and 'Der Spiegel' reported the story
02/10/2018	The case was reopened by the Las Vegas police department
03/10/2018	Ronaldo publicly denied the allegations
04/10/2018	Two of Ronaldo's biggest sponsors expressed their concerns
04/10/2018	Portugal's National Football Coach decides that Ronaldo will not be part of the National Team for the rest of 2018, though did not comment on the allegation
10/10/2018	Ronaldo's lawyer claimed that the documents published by Der Spiegel are a made-up story

Table 1: This table shows the timeline of the rape allegation scandal and its major milestones.

In line with the presented findings of Carrilla et al. (2013), the timeline of the rape allegation scandal of Cristiano Ronaldo consists of reactions from multiple parties who are working closely with Ronaldo.

The news itself was shocking to the public but were also further intensified by the #metoo movement. Since October 2017, women who have been victims of sexual assaults have been making their stories public under the hashtag #metoo (The Economist 2018). The lawyer of

Mayorga revealed that the movement encouraged her to also make her story public (Der Spiegel staff 2018). In addition, Ronaldo's market environment was pressured by their internal codes of conduct, which attracted more attention due to the recent activities of the European Commission to support fair play and cooperation in sport (European Commission 2014). As a consequence, Electronic Arts directly reacted to the accusations by eliminating Ronaldo from their social media platform on the 5th of October, and later also from the FIFA19 cover (McGladdery 2018; Riaz 2019). Due to the intense reactions of this off-field transgression, the question is raised whether the market environment of Ronaldo suffered losses in the course of the event. This is of particular interest as the infidelity scandal of Tiger Woods surprisingly did not reveal significant negative returns for his sponsoring environment (Leeds 2010). The following graph gives a first indication of the impact of the scandal on Ronaldo's sport-related sponsors, which suffer the most due to the higher athlete-product congruence (Kim and Na 2007, p. 23).

Cumulated stock returns during the rape allegation scandal

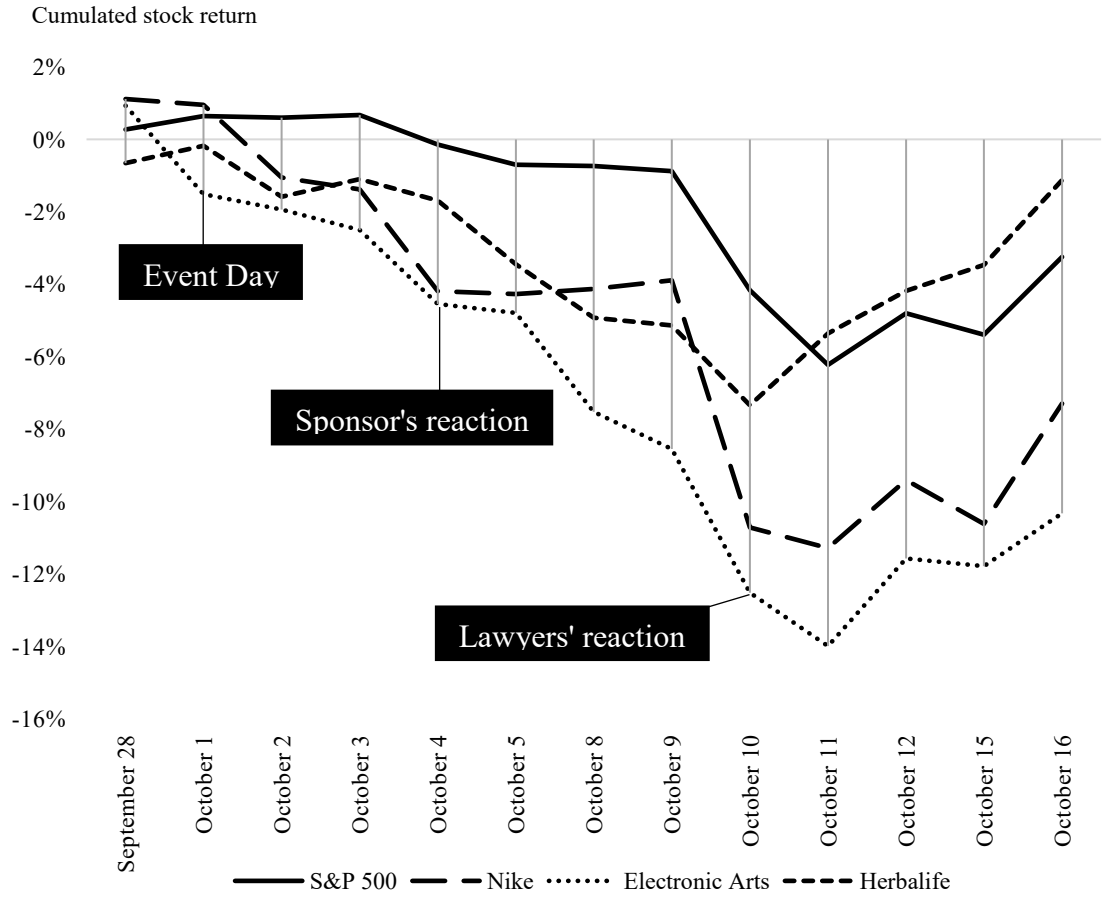

Figure 2: This figure shows the cumulated stock returns of Ronaldo's sport-related endorsement deals with Nike, Electronic Arts and Herbalife as well as the benchmark performance of the S&P 500 at the time of the announcement of Ronaldo's rape accusation.

The graph displays that all three sport-related sponsors for Cristiano Ronaldo suffered losses in the days after the accusation was made public. Further steps for the analysis will be explained in the methodology section. The performance of the S&P 500 on the 9th of October and the 10th of October raises questions regarding a confounding event, which also will be examined in the following section of the thesis.

4 Methodology

4.1 Application of event study methodology

4.1.1 Calculations and parametric tests

The aim of an event study is to test whether an unexpected event is causing significant abnormal stock returns. The first step is to calculate "normal" returns for the companies in the sample by estimating their expected returns. Various approaches exist to measure normal performance. This thesis is applying the market return model (MRM) and the constant return model (CMRM), as these two models are the most favoured in the literature and the added value of more sophisticated models is found to be limited (MacKinlay 1997, p. 17). According to McWilliams and Siegel (1997, p. 628), the MRM is estimating normal performance by conducting a regression that is measuring the dependence of the stock return of company i on day t (R_{it}) on the market return on day t (R_{mt}). The method is expressed as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

where α_i and β_i are the ordinary least squares parameters estimates and ε_{it} is the error term, with the condition $E(\varepsilon_{it}) = 0$.

The next step is to calculate the daily abnormal returns of a firm (AR_{it}) by using the actual stock return of a firm and the estimates from the MRM, presented in the following equation:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt})$$

The alternative to the MRM is the CMRM, where the expected return ($E[R_i]$) is assumed to be constant and estimated by the mean stock return of the company over a specific time period T, which is called estimation window:

$$E[R_i] = \frac{1}{T}\sum_{t=1}^{T} R_{it}$$

Again, the difference between actual return and estimated return is used to calculate the AR_{it}:

$$AR_{it} = R_{it} - E[R_i]$$

The decision of the length of the time period T will be explained in the section estimation window and event window.

Since the MRM is incorporating the movements in the market, the variance of the ARs is reduced compared to that of the CMRM. The market model is, thus, more suitable to discover event effects. Nevertheless, in this thesis both methods are applied as the CMRM is a useful parameter to compare the results from the market model (MacKinlay 1997, p. 17).

In order to be able to test for the significance of the ARs ($t_{AR_{it}}$), the null hypothesis of no abnormal returns is tested in the following equation, with the abnormal returns being divided by the standard deviation of the abnormal returns for each firm i (SD_{AR_i}):

$$t_{AR_{it}} = \frac{AR_{it}}{SD_{AR_i}}$$

where

$$SD_{AR_i} = \left[\frac{1}{T-2}\sum_{t=1}^{T} AR_{it}^2\right]^{0,5}$$

In order to be able to also capture the effect of the stock return for each company i over the course of the event, cumulated abnormal stock returns (CAR) will be calculated by summing up the $AR_{it}s$ on the k days of the event period:

$$CAR_i = \sum_{t=1}^{k} AR_{it}$$

To test for the significance of the CAR (t_{CAR}), the CAR will be divided by its standard deviation (SD_{CAR}), which will be calculated by:

$$t_{CAR_i} = \frac{CAR_i}{SD_{CAR_i}}$$

where

$$SD_{CAR_i} = \left[\frac{k}{T-2}\sum_{t=1}^{T} AR_{it}^2\right]^{0,5}$$

Until now, the presented calculations were solely focussing on the impact of the event on each firm separately. For this thesis, it is also interesting to measure the influence of the event on a group of firms. To do so, McWilliams and Siegel (1997, p. 628) are proposing the following procedure. For each firm i the abnormal returns are standardised by its standard deviation using the following equation:

$$SAR_{it} = \frac{AR_{it}}{SD_{it}}$$

where

$$SD_{it} = \left\{ S_i^2 \left[1 + \frac{1}{T} + \frac{(R_{m\tau} - R_m)^2}{\sum_{t=1}^{T} (R_{mt} - R_m)^2} \right] \right\}^{0,5}$$

S_i^2= Residual variance obtained from the MRM for firm i

$R_{m\tau}$= market return on day t in the event period

R_{mt}= market return on day t in the estimation period

R_m= average market return in the estimation period

Afterwards the obtained $SARs$ can also be accumulated over the time of the event to receive a cumulative standardized abnormal return for each firm i ($CSAR$):

$$CSAR_i = \frac{1}{\sqrt{k}} \sum_{t=1}^{k} SAR_{it}$$

By using this calculation, the assumption is to achieve values for the $CSARs$ that are independent and identically distributed. Hence, it is possible to group n firms together by averaging their $CSARs$ on the days of the event period ($ACSAR$) and dividing them by its standard deviation:

$$ACSAR_t = \frac{1}{N} \times \frac{1}{\sqrt{(T-2/(T-4)}} \times \sum_{i=1}^{N} CSAR_{it}$$

In order to analyse whether the event is affecting the n companies as a group (significantly different from zero), the following test statistic will be applied:

$$Z_t = n^{0,5} \times ACSAR_t$$

As the event dates are the same for all the studied companies, it is necessary to have no covariance across the abnormal returns of the companies (MacKinlay 1997, p. 27).

4.1.2 Nonparametric tests

The presented parametric tests are based on the assumption of normality. On the contrary, non-parametric tests do not require such strong assumptions regarding their return distribution (Cowan 1992, p. 343). As abnormal return distributions often show fat tails and indicate positive skewness (Serra 2002, p. 7), non-parametric tests are a useful addition to the presented methods of the previous section. Besides, they help to identify outliers and can, thus, serve as

a robustness check for the parametric test (McWilliams and Siegel 1997, p. 635). For this dissertation the generalized sign test and the Wilcoxon signed-rank test will be applied.

The generalized sign test takes into consideration the mentioned possibility of an asymmetric return distribution by comparing the proportion of non-negative abnormal returns of the event window (p_0) with those from the used estimation window (p) (Dutta 2014, p. 138). The corresponding null hypothesis is that the difference between the fractions is not significantly different from zero. The test will be performed for each firm itself as well as for selected groups of firms.

$$p = \frac{1}{n}\sum_{i=1}^{n}\frac{1}{T}\sum_{t=1}^{T}S_{it}$$

Where

$$S_{it} = \begin{cases} 1 \; if \; AR_{it} > 0 \\ 0 \; otherwise \end{cases}$$

The generalized sign test is:

$$Z_G = \frac{|p_0 - p|}{\left[\frac{p(1-p)}{n}\right]^{0,5}}$$

According to Dutta (2014, p. 139), the Wilcoxon signed-rank test does not only consider the sign of the abnormal returns but also tests the magnitude of the returns. The absolute values of the AR in the event window will be ranked (R_i) from the smallest to the largest and afterwards the sign will be added back. The positive and negative ranks are independently summed to W+ and W- respectively:

$$W_+ = \left|\sum_{i=1}^{n} R_{i+}\right|$$

and

$$W_- = \left|\sum_{i=1}^{n} R_{i-}\right|$$

According to the Wilcoxon signed-rank test table the minimum value of W_- and W_+ will be compared to stated $W_{Critical\ value}$. For the case that $W < W_{Critical\ value}$, the null hypothesis of equally likely negative or positive AR will be rejected. The $W_{Critical\ value}$ is measured

according to the size of the sample. For samples that consist of more than 20 values the following formulas are used to test significance:

$$z = \frac{W}{\sigma_w}$$

where

$$\sigma_w = \left[\frac{n(n+1)(2n+1)}{24}\right]$$

4.1.3 Estimation and event window

In the previous sections it was described that the estimation window is used for the calculation of expected returns. In line with MacKinlay (1997, p. 17) this dissertation will apply an estimation window of 250 days prior to the Cristiano Ronaldo rape allegation scandal. It is common practice to not have any overlap between the estimation window and the event window, so that any influence of the event on the estimated returns is prevented. However, the determination of the event window is more difficult. According to McWilliams and Siegel (1997, p. 636), one need to consider that the length of the event window is selected to capture the significant effect of the event without including confounding effects.

In section three, the timeline of the rape allegation scandal was presented. It showed that the first report of Ronaldo being accused of the rape of Kathryn Mayorga was published by 'Der Spiegel' 29th September 2018. In order to consider the possibility of information being leaked prior to the announcement, this thesis will include 28th September 2018 in the event window, the day before the publication of 'Der Spiegel'. As the 29th September 2018 is a Saturday, the event day is considered to be the first full trading day, which is 1st October 2018. To capture the reaction of Ronaldo´s lawyers and the next full trading day, the last day of the event window will be 11th October 2018. In sum, the event window will consist of 10 trading days.

As approximately 68% of the event studies apply event windows that close within five trading days (Oler, Harrison, and Allen 2008, p. 154) the chosen period in thesis might seem too long. However, considering the multiple reactions that can be observed, it seems reasonable to include more than five trading days. Moreover, similar studies conducted on the Tiger Woods infidelity scandal also included more than 10 days in the event window for the same reason (Hood 2012, p. 547).

The following figure presents the estimation and event window for the rape allegation scandal of Cristiano Ronaldo.

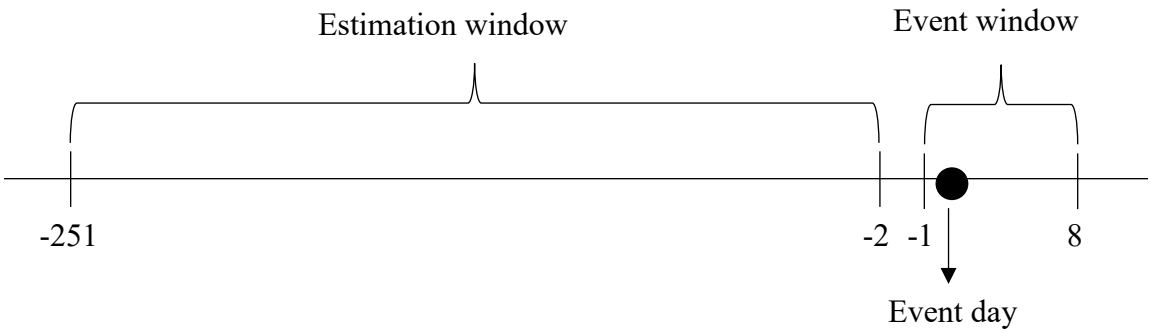

Figure 3: This figure presents the defined time frames for the estimation and the event window for the rape allegation scandal of Cristiano Ronaldo.

In the validation section, the event window will be extended to test whether there are significant abnormal returns outside of the defined event window that are yet not captured. Again, there will be no overlap of the estimation and event window.

4.2 Instagram Analysis

As already mentioned in the literature review and in the presentation of Ronaldo's marketing opportunities, social media plays an increasingly important role in the sponsoring relationship between athletes and companies. This is reflected by the sponsors' enormous willingness to pay for athlete endorsement, so that Ronaldo, for instance, can demand approximately $750k per posting that includes an ad-based picture.

The sponsoring companies benefit from Ronaldo's social media reach. Therefore, the stock market reactions could in a way also be related to Ronaldo's social media performance. Hence, in this dissertation an analysis of Ronaldo's Instagram account will be conducted in order to determine whether the results of the event study are consistent with the response of the followers on Ronaldo's Instagram account. In detail, it will be investigated whether the daily follower increase during the event period is significantly different from the period before the event occurred. The method used to analyse Ronaldo's daily increase of Instagram followers in absolute terms to that of comparable sports stars is the difference-in-difference approach. Neymar and Messi will be used as comparative figures (control group), since they are the 2nd and 3rd most followed athletes on Instagram. In the analysis, the difference of Ronaldo's average of the absolute daily increase of Instagram followers before the event is compared with his daily average increase during the event period (1st difference). In a second step the same analysis will be conducted for his control group. The difference of the control group will then be compared

to the difference result of Ronaldo, called difference-in-difference. The following regression shows how the analysis will be performed:

$$Y_i = \alpha + \beta T_i + \gamma t_i + \delta(T_i \times t_i) + \varepsilon_i$$

where

Y_i= Average of the absolute daily increase of Instagram followers

β= Ronaldo effect (Treatment group effect)

T_i=1 for Ronaldo and T_i=0 for compared athlete

γ= Time trend common for the control group and the treatment group

t_i= 1 for the event window days and t_i= 0 for the days of the estimation period

δ= true effect of the treatment

Especially the independent variable δ is very important for the analysis, because it will show the difference-in-difference result, which means it shows the true effect of the rape allegation scandal. The selected event window for the Instagram analysis is 14 days and thus matching the window of the parametric test, however including the weekends. The estimation window has the same amount of days and again ensures no overlapping. Additionally, the estimation window will also be increased in the robustness check for the analyses.

4.3 Data and variables

This section is showing which data is used for the analysis of the event and explaining how the data is structured on the basis of the literature research.

The first step was to research Ronaldo's market environment. The market environment is defined by his endorsement deals, his CR7 brand as well as his team Juventus Turin. Ronaldo's market environment consists of 35 brands (Internet benchmarking). He had signed 30 endorsement deals throughout his career, has four still active cooperation's between his CR7 Brand and other companies, and is playing for the Italian football team Juventus Turin. In particular, three findings from the literature review can be used to structure the data.

According to Kim and Na (2007, p. 23), endorsement deals with high athlete-product congruence are more effective. This becomes even more apparent when looking at the Floyd Landis doping scandal. In this case, the stock course of the sponsor 'Phonak hearing systems' (low athlete-product congruence) generated significant positive cumulative abnormal return in the course of the events (Leeds 2010). For this reason the endorsement deals of Ronaldo are

categorised between the sport-related sponsors (high product-athlete congruence) and the non-sport-related sponsors (lower product-athlete congruence).

In addition, the topicality of the endorsement deal is seen as an important factor in determining whether investors still make a connection between the endorsed brand and Ronaldo. Hence, the endorsement deals will be categorised in current and expired deals.

Concerning the inclusion of Ronaldo's club Juventus Turin in the analysis, two facts support this decision. Firstly, the findings of Carlson and Donovan (2008), that fans' positive identification with an athlete is also transferred to their level of support of the team. Secondly, the presented stock market performance of Juventus Turin during the Ronaldo transfer highlights the impact of Ronaldo on his teams.

In order to perform the analysis presented in the previous sections, it is required that the brands of Cristiano Ronaldo's market environment are listed companies. From all the 35 identified firms, only 11 are listed on the stock market. Due to the fact that insufficient stock market data was accessible for two companies (MTG Co Ltd and Yamamay), nine companies remain to be analysed. Additionally, six companies have a parent company and are not listed on the stock market. However, two of the six parent companies are listed and can therefore be analysed as an additional group. The following table presents the identified companies that can be examined:

Market environment overview Cristiano Ronaldo

Current		Expired		Parent company
sport-related	non-related	sport-related	non-related	expired+non-related
Electronic Arts	Altice	Konami	Abbott Laboratories	BP
Herbalife			Samsung	Yum!Brands
Juventus Turin			Toyota	
Nike				

Table 2: This table shows the allocation of Cristiano Ronaldo's market environment into the categories current and expired market environment as well as the endorsement deals where the company has a parent company that is listed on a stock market.

A full overview with more details of all the identified companies is presented in Table 1 in Appendix B.

The stock market information used in the analysis of the presented companies were retrieved from Thomson Reuters Eikon. The daily closing price as well as the change in percentage of the stock prices were obtained for the set estimation window and the event window. The following table shows the selected benchmark that is analysed with the MRM in this dissertation. For each company the selected benchmark is the respective market index.

Benchmarks MRM					
S&P 500	Euronext 150	Nikkei 225	KOPSI 200	FTSE MIB	FTSE 100
Abbott Laboratories	Altice	Konami	Samsung	Juventus Turin	BP
Electronic Arts		Toyota			
Herbalife					
Nike					
Yum!Brands					

Table 3: This table shows the selected benchmark for each of the companies that is analysed with the MRM in this dissertation.

To conduct a robustness test on the MRM, the respective stock market index was replaced by using the competitor as the benchmark. For the calculation of the daily excess return, for each company the respective government bond was retrieved from Thomson Reuters Eikon. In this respect, detailed information is shown in Table 1 Appendix B. In addition, for each company the number of shares outstanding was retrieved from the annual report of the respective company to compute the market capitalization.

Regarding the Instagram analysis, the development of followers over time was retrieved from the webpage trackalytics.com

Descriptive Statistics

The descriptive statistics of the sport-related endorsement deals show a mean of zero for the abnormal returns from the estimation period (Table 1 in Appendix C and for the remaining Table 2 in Appendix C). As mentioned before, the MRM should be more capable to detect event effects. The descriptive statistics confirm this in all cases by displaying higher standard errors for the CMRM compared to the MRM. Additionally, in all cases the excess kurtosis is highly positive, which indicates higher probability of extreme values. Except for Electronic Arts, the abnormal returns for all sport-related endorsement deals are positively skewed, therefore it is more likely to obtain extremely positive abnormal returns. Overall, the descriptive statistic confirms that the distribution of the abnormal returns is not normally distributed for the selected sample. It hence underlines the importance of non-parametric tests as a supplement method. However, the characteristics of the sport-related group are not as extreme and, thus, closer to a normal distribution.

4.4 Hypotheses

Based on the literature review as well as the introduction of the event in section three, it is assumed that the currently endorsed companies will suffer significant negative abnormal returns during the event window. The strongest impact is expected on the current sport-related market environment, because of the higher athlete-product congruence. The same applies to the results

of the CARs as well as ACSARs. They should be influenced by the immense number of media reactions throughout the event. On the contrary, for the expired endorsement deals as well as the endorsed companies that have a parent company, no abnormal returns are assumed to be identified. This assessment is based on the fact that for both groups it is unlikely that investors will perceive the brand as represented by Ronaldo. It is expected that the robustness test on the MRM, where the respective stock market index is replaced by using the competitor as the benchmark, will not lead to different results.

Due to the high activity of endorsed companies on social media, it is assumed that the results of the Instagram analysis are showing the same pattern as the parametric tests of the sport-related endorsers.

4.5 Confounding Events

It is crucial to make sure that the results are caused by the event and are not influenced by a cofounding event. Therefore, the endorsed companies will be reviewed for the occurrence of a confounding event in both the estimation and the event window. This is important, as the companies of the sample are mostly international companies that for this reason have a higher likelihood to be affected by confounding events. Particularly Juventus Turin will be reviewed closely because the stock market performance shows high correlation to the sport performance of the team. In case a disturbance factor will be identified, the abnormal returns for this date will be eliminated from the sample. This approach follows the assessment of Foster (1980) on how to control for confounding effects. The relevant analyses for this dissertation are presented in the results section 5.3.3.

5 Results

5.1 Event study results

5.1.1 Sport-related market environment

Throughout the event window, all sport-related companies of the sample suffer negative cumulated abnormal returns with the MRM. With an abnormal stock price loss of 25,2%, Juventus Turin was affected the most (Table 1 in Appendix D). However, the null hypothesis of no cumulated abnormal returns can only be rejected for Juventus Turin and Nike, at a level of 1% and 5% respectively. For both Herbalife and Electronic Arts the low point appears on day seven with a loss of 6,5% and 6,8% which is insignificant. The following graph presents an overview of the cumulated abnormal returns for the sport-related group using the MRM to estimate returns.

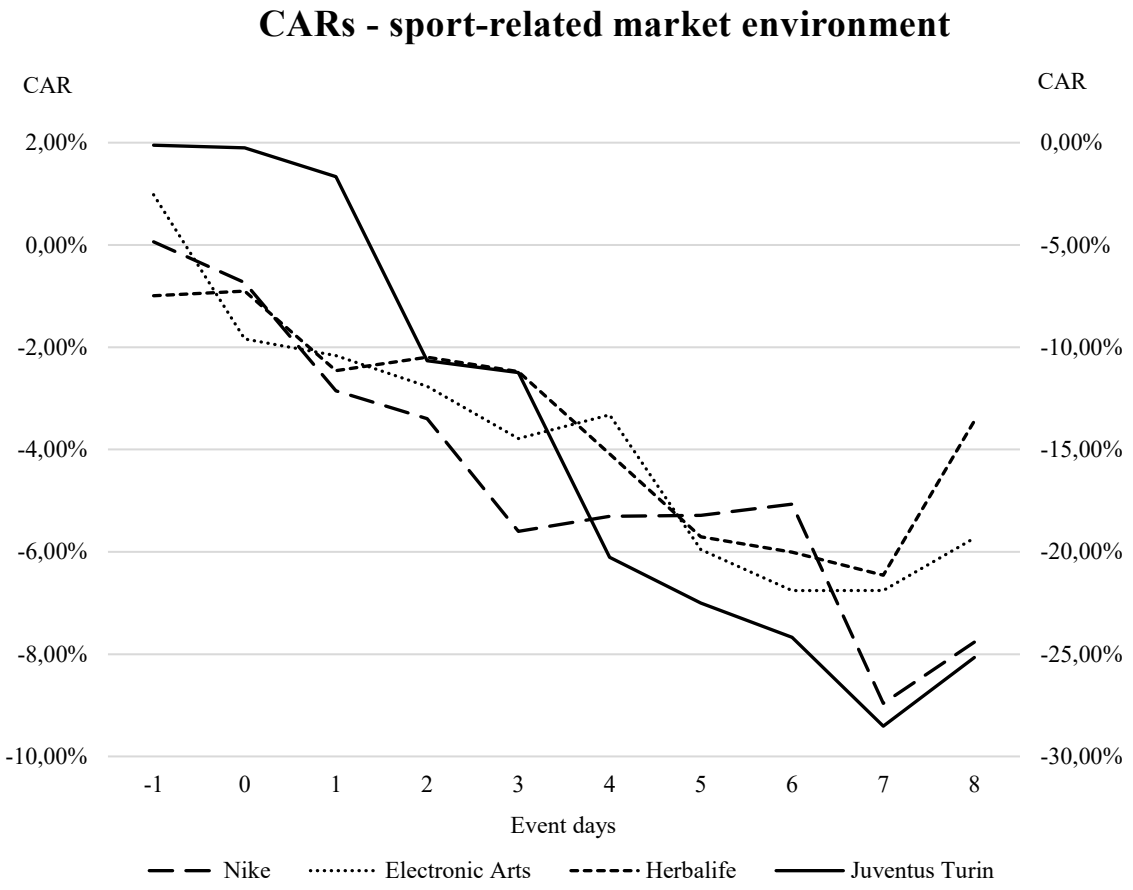

Figure 4: This figure shows the CARs of the sport-related sample during the defined event window of the Cristiano Ronaldo rape allegation scandal, calculated with the MRM. On the primary axis Nike, Electronic Arts and Herbalife are displayed, whereas the cumulated abnormal returns of Juventus Turin belong to the secondary axis.

The CARs obtained with the CMRM reveal a more significant influence of the rape allegation scandal on the four sport-related companies. For Juventus Turin and Nike the null hypothesis of no CAR is rejected at the 1% level and for Electronic Arts at the 5% level. Even for Herbalife, event day seven indicates a CAR of -9.4% which is significantly different from zero at the 10% level. However, these more negative returns are accompanied by a downward trend in the respective benchmark. This reinforces the decision to use the MRM as the primary model.

In the following, the abnormal returns with the MRM of the event window will be analysed on a daily basis. On the event day (day 0), the stocks of the sport-related sample recorded negative abnormal returns. However, with an abnormal return of -2.82%, Electronic Arts is the only company that rejects the null hypothesis of no abnormal returns at the 10% level for the day 'Der Spiegel' reported the story for the first time (Table 1 in Appendix D). On event day five, Electronic Arts suffered another negative abnormal return, which is significantly different from zero at 10% level. Both Juventus Turin and Nike also recorded two days of negative abnormal returns, which reject the null hypothesis of no abnormal returns. For Juventus, the ARs on day

two and four were -9% and, thus, significantly different from zero at the 1% level. On day three and seven of the event window, Nike suffered abnormal losses of 2.2% and 3.9% which reject the null hypothesis of no abnormal returns at the 10% and 1% level respectively. These results are surprising in two ways. On the one hand, it was not expected to obtain six out of ten days with negative abnormal returns that are significantly different from zero. On the other hand, it is astonishing that there is no day where more than one company is suffering losses that are rejecting the null hypothesis of no abnormal returns. These results make it difficult to relate the losses of all sport-related companies equally to each of the three main reactions shown in figure two.

To measure the impact of the whole sport-related group, ACSARs were calculated (Table 4). The ACSARs of the MRM show negative results since event day zero and are significantly different from zero at the 5% level from day two onwards. In the following, each additional day within the event window is even significantly different from zero at the 1% level. The results from the CMRM show a similar trend. These results are more significant. Hence, both models reveal that the Cristiano Ronaldo rape allegation scandal negatively impacted his current sport-related market environment.

Average Cumulative Standardized Abnormal Return

			MRM		CMRM	
Sample	Event Day	Date	ACSAR	Z	ACSAR	Z
sport-related market environment	-1	28/09/2018	0,02	0,03	-0,31	-0,62
	0	01/10/2018	-0,41	-0,82	-0,52	-1,05
	1	02/10/2018	-0,79	-1,59	-0,88	-1,75*
	2	03/10/2018	-1,16	-2,32**	-1,16	-2,33**
	3	04/10/2018	-1,34	-2,67***	-1,48	-2,96***
	4	05/10/2018	-1,58	-3,16***	-1,84	-3,68***
	5	08/10/2018	-1,78	-3,56***	-2,08	-4,15***
	6	09/10/2018	-1,76	-3,52***	-2,03	-4,06***
	7	10/10/2018	-2,05	-4,09***	-2,73	-5,46***
	8	11/10/2018	-1,59	-3,19***	-2,58	-5,15***

Table 4: This table shows the average cumulative standardized abnormal returns of the sport-related market environment during the defined event window of the Cristiano Ronaldo rape allegation scandal, calculated with the MRM and CMRM. The z values determine whether the null hypothesis of ACSAR is equal to zero is rejected or not.

*Rejects the null hypothesis at the 10% significance level
** Rejects the null hypothesis at the 5% significance level
*** Rejects the null hypothesis at the 1% significance level

As it is a new approach to group a football team together with the endorsed companies, this dissertation also separately tests the impact on the endorsed companies that are sport-related, thus excluding Juventus Turin (Table 2 in Appendix D). Therefore, this dissertation can compare the results to the previous findings of the literature. The ACSARs of the MRM show negative results since event day zero and are significantly different from zero at the 5% level from day three onwards. On day seven, the ACSARs reach the lowest value and are rejecting the null hypothesis of the event having no impact at the 1% level. Again, the results from the CMRM follow a similar trend and are even more significant. The Cristiano Ronaldo rape allegation scandal, thus, also negatively impacted the sport-related companies that are endorsed by Ronaldo.

In order to examine the robustness of the parametric test results, this part reviews the findings of the non-parametric test and sets the results of the parametric test into relation to the findings obtained by using the respective competitor as a benchmark in the MRM. The generalized sign test reveals that the fraction of abnormal returns in the event window is significantly different to the estimated fraction of abnormal returns for the group of the sport-related companies (Table 3 in Appendix D). These results are obtained by both the MRM and CMRM, with a respective significance level of 5% and 1%, and show consistency across the parametric and the non-parametric test. The CMRM confirms this consistency also on a company-based level, by revealing significant values for Nike, Electronic Arts and Juventus Turin, whereas the MRM only detects a significant value for Juventus Turin and, thus, weakens the findings of the parametric test slightly (Table 4 in Appendix D).

The generalized sign test did not take the magnitude of the abnormal returns into account. Therefore, the Wilcoxon signed-rank test was conducted. The test results once again confirm the negative impact of the event on the group of the sport-related companies, by a significance level of 1% with both the MRM and the CMRM (Table 5 in Appendix D).

For the sport-related group, this dissertation conducted a further robustness check by using the respective competitors of the companies as the benchmark in the MRM. For the analysis of Nike, the biggest sports equipment manufacturer of America, Europe and Asia were used as the benchmark (Under Armour, Adidas and Asics). The results for the CAR confirm the already presented findings and reveal even more significant results (Table 6 in Appendix D). Regarding the other companies of the sport-related sample, a similar pattern was identified and underline the robustness of the test results (Table 7, 8 and 9 in Appendix D).

5.1.2 Non-sport-related market environment

According to the presented findings of the literature regarding product-athlete congruence, the market environment of Ronaldo was divided into between the sport-related (high product-athlete congruence) and the non-sport-related (lower product-athlete congruence).

Contrary to the sport-related group no significant abnormal returns occurred during the event window for the non-sport-related market environment of Ronaldo (Table 10 in Appendix D). Although on the day of the event (day=0) the abnormal return was negative for both the MRM and CMRM, it was not significantly different from zero. For the whole event window, not a single day revealed abnormal returns that are rejecting the null hypothesis of no abnormal returns. The same results occurred for the CARs as well as for the ACSARs, presented in the following table. Thus, this dissertation concludes that the non-sport-related group was not impacted by the Cristiano Ronaldo rape allegation scandal. However, it must be noted that this group only consists of one company (Altice), which limits the extent to which the sample can be generalized.

Average Cumulative Standardized Abnormal Return

			MRM		CMRM	
Sample	Event Day	Date	ACSAR	Z	ACSAR	Z
non-sport-related market environment	-1	28/09/2018	-0,33	-0,33	-0,44	-0,44
	0	01/10/2018	-0,49	-0,49	-0,46	-0,46
	1	02/10/2018	-0,12	-0,12	-0,18	-0,18
	2	03/10/2018	-0,01	-0,01	-0,01	-0,01
	3	04/10/2018	0,29	0,29	0,19	0,19
	4	05/10/2018	0,38	0,38	0,18	0,18
	5	08/10/2018	0,27	0,27	-0,04	-0,04
	6	09/10/2018	0,10	0,10	-0,14	-0,14
	7	10/10/2018	0,53	0,53	0,12	0,12
	8	11/10/2018	0,33	0,33	-0,16	-0,16

Table 5: This table shows the average cumulative standardized abnormal returns of the non-sport-related market environment during the defined event window of the Cristiano Ronaldo rape allegation scandal, calculated with the MRM and CMRM.

Again, the results were challenged by the non-parametric tests (Table 3 and 5 in Appendix D). The generalized sign test confirms the results from the parametric tests as the fraction of abnormal returns of the event window is not significantly different from the one of the estimation window. Furthermore, the Wilcoxon signed-rank test confirms the results that the non-sport-related group was not impacted by the Cristiano Ronaldo rape allegation scandal.

5.1.3 Expired endorsement deals

The group of the expired endorsement deals is of interest as it is unclear whether investors still perceive the brand to be connected with Ronaldo. For each company in the sample, no CARs, calculated with the MRM, were significantly different from zero (Table 11 in Appendix D). For the CARs of the CMRM only Abbott Laboratories reveals two days with negative CARs that are rejecting the null hypothesis of no CARs at the 5% level. However this result can be neglected since this finding is driven by the benchmark index's strong fall at the end of the event window. In line with the results of the company level, the ACSARs for the group of the expired endorsement deals in the event window are, at no time, significantly different from zero for both the MRM and CMRM. Thus, the Cristiano Ronaldo rape allegation scandal has not impacted the group of the expired endorsement deals.

Average Cumulative Standardized Abnormal Return

			MRM		CMRM	
Sample	Event Day	Date	ACSAR	Z	ACSAR	Z
expired endorsement deals	-1	28/09/2018	0,11	0,23	0,36	0,72
	0	01/10/2018	-0,01	-0,03	0,32	0,64
	1	02/10/2018	0,31	0,61	0,30	0,61
	2	03/10/2018	0,04	0,08	-0,10	-0,19
	3	04/10/2018	0,19	0,37	-0,20	-0,40
	4	05/10/2018	0,48	0,96	-0,16	-0,32
	5	08/10/2018	0,35	0,69	-0,37	-0,74
	6	09/10/2018	0,38	0,76	-0,72	-1,44
	7	10/10/2018	0,52	0,90	-0,62	-1,24
	8	11/10/2018	0,53	0,92	-0,93	-1,62

Table 6: This table shows the average cumulative standardized abnormal returns of the expired endorsement deals during the defined event window of the Cristiano Ronaldo rape allegation scandal, calculated with the MRM and CMRM.

The robustness tests once again confirm the finding that the group expired endorsement deals is not impacted by the studied event (Table 3 and 5 in Appendix D).

5.1.4 Parent company

For the endorsed companies where only the parent company is listed, it is of interest to analyse whether investors perceive the parent company to be connected with Ronaldo. The analyses show that no CARs, calculated with the MRM, were significantly different from zero (Table 12 Appendix D). For the CARs, calculated with the CMRM, only BP revealed a significant negative CAR at the 10% level on the last day of the event window. Again, this can be neglected since the finding is driven by the benchmark index's strong fall at the event of the event

window. The ACSARs of the group parent company confirm the results of the company level, because no day within the event window is significantly different from zero. Thus, the Cristiano Ronaldo rape allegation scandal has not impacted the group of the parent companies.

Average Cumulative Standardized Abnormal Return

			MRM		CMRM	
Sample	Event Day	Date	ACSAR	Z	ACSAR	Z
Parent companies	-1	28/09/2018	0,23	0,33	-0,06	-0,09
	0	01/10/2018	0,32	0,45	0,03	0,04
	1	02/10/2018	0,30	0,43	-0,08	-0,11
	2	03/10/2018	0,02	0,02	-0,13	-0,18
	3	04/10/2018	0,51	0,72	-0,18	-0,25
	4	05/10/2018	0,65	0,92	-0,37	-0,53
	5	08/10/2018	0,61	0,86	-0,56	-0,80
	6	09/10/2018	0,75	1,06	-0,40	-0,57
	7	10/10/2018	0,75	1,07	-0,93	-1,32
	8	11/10/2018	0,56	0,79	-1,56	-2,21*

Table 7: This table shows the average cumulative standardized abnormal returns of the parent companies during the defined event window of the Cristiano Ronaldo rape allegation scandal, calculated with the MRM and CMRM.

The robustness tests once again confirm the finding that the group parent companies is not impacted by the studied event (Table 3 and 5 in Appendix D).

5.2 Instagram analysis

The goal of the Instagram analysis is to check whether the event affected Ronaldo's amount of Instagram followers. To do that, in the first step the average of the absolute daily increase of Instagram followers was compared between the estimation window and the event window. For Ronaldo and his competitors, Messi and Ronaldo, on every day in the two periods their account recorded an increase in followers. However, Ronaldo's average of the absolute daily increase of followers is 19k less in the event window than in the estimation window, whereas Neymar's numbers are almost constant and just recorded a slight difference of 51 followers. Messi's average of the absolute daily increase of followers also decreased in a dimension comparable to Ronaldo from 59,4k in the event window to 41,7k in the estimation window. The findings of the first difference is presented in the following figure.

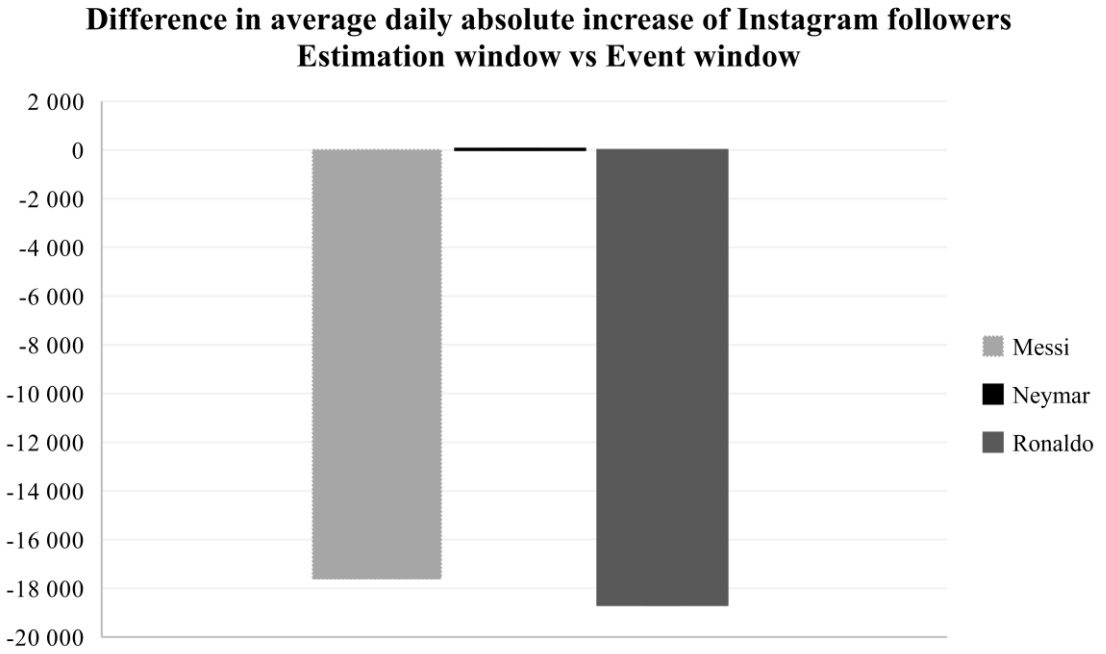

Figure 5: This figure shows the difference of the average daily absolute increase of Instagram followers of Messi, Neymar and Ronaldo between the estimation window and the event window.

It was investigated whether there were any indications why the average of the absolute daily increase of followers of Messi decreased for the event window compared to the estimation window. No reasons could be identified to explain the drop since FC Barcelona and Messi performed well in both periods. Especially the performance of the Barcelona winning 4:2 in the Champions League against Tottenham Hotspurs on the 3rd of October with Messi scoring two goals do not provide clues. Additionally, there were no news reports on any personal issues of Messi for both time periods. The same was checked for Ronaldo and Neymar and the only occurrence was the rape allegation scandal of Ronaldo. In order to complete the difference-in-difference approach the regression between Ronaldo and each competitor was performed (Table 13 in Appendix D). For Ronaldo and Neymar the calculation show the following regression:

$$Y_i = 54232 + 34529 * T_i + 50{,}55 * t_i - 18741(T_i \times t_i) + \varepsilon_i$$

Y_i= Average of the absolute daily increase of Instagram followers

T_i=1 for Ronaldo and T_i=0 for compared athlete

t_i= 1 for the event window days and t_i= 0 for the days of the estimation period

The difference-in-difference estimator here is -18741 and rejects the null hypothesis that there is no change from before to after the publication of the rape allegation scandal at the 1% level. The analyses indicate that without the occurrence of the rape allegation scandal Ronaldo's

average of the absolute daily increase of followers would have been 18741 higher in the event window.

However, the figure five already indicated different results for the comparison of Ronaldo to Messi. The performed regression analyses show a negative difference-in-difference estimate of 1007, which is, however, insignificant (Table 14 in Appendix D).

$$Y_i = 59354 + 29406 * T_i - 17638{,}26 * t_i - 1007(T_i \times t_i) + \varepsilon_i$$

The results are, thus, split for the comparison of Ronaldo and Neymar: the investigations show an impact of the rape allegation scandal on Ronaldo's Instagram account whereas this does not hold true for the case of Messi.

To also perform a robustness check, the time of the estimation window was increased to the beginning of the year 2018 in order to include more data points for the estimation. The performed regression shows both for Ronaldo to Neymar and Ronaldo to Messi negative difference-in-difference estimates which are however not significantly different from zero (Table 15 and Table 16 in Appendix D). Hence, the Instagram analysis is not supporting the findings of the parametric-tests for the sport-related group.

5.3 Validation

The literature review on event study methodology presented how important it is to adhere to the following assumptions for the successful conduct of an event study analysis: Unanticipated event, efficient market reaction and inexistence of confounding events (McWilliams and Siegel 1997, p. 630). These assumptions are often disregarded and affect the results of an event study. In order to ensure that the obtained results of the Cristiano Ronaldo rape allegation scandal follow the three assumptions, this section is validating the findings outlined before.

5.3.1 Anticipation

Under the assumption of perfect capital markets traders would not be able to have early access to information published by the press. However, in reality investors might be able to get information before the actual announcement (McWilliams and Siegel 1997, p. 634). For the press release of 'Der Spiegel' on 29th September 2018, it cannot be ruled out that investors had premature access to the information. Especially for the surroundings of Juventus Turin, there is the possibility that information was already known before. In order to control for inside trading, this dissertation also analysed the day before the press release within the event window. None of the examined companies revealed abnormal returns that are significantly different from zero. To ensure that no information was leaked before the set event window, this section tested for

the whole week before the event window whether abnormal returns that are significantly different from zero occurred for the companies of the sport-related market environment of Cristiano Ronaldo (Table 17 in Appendix D). The analysis shows that there is no abnormal return on any of these days. Additionally, on a cumulated basis the null hypothesis of no cumulated abnormal returns could not be rejected for any of the tested companies. The following graph presents the stock performance of the sport-related sample before the event period to check for an unanticipated event and after the event period to see whether the market reacted efficiently.

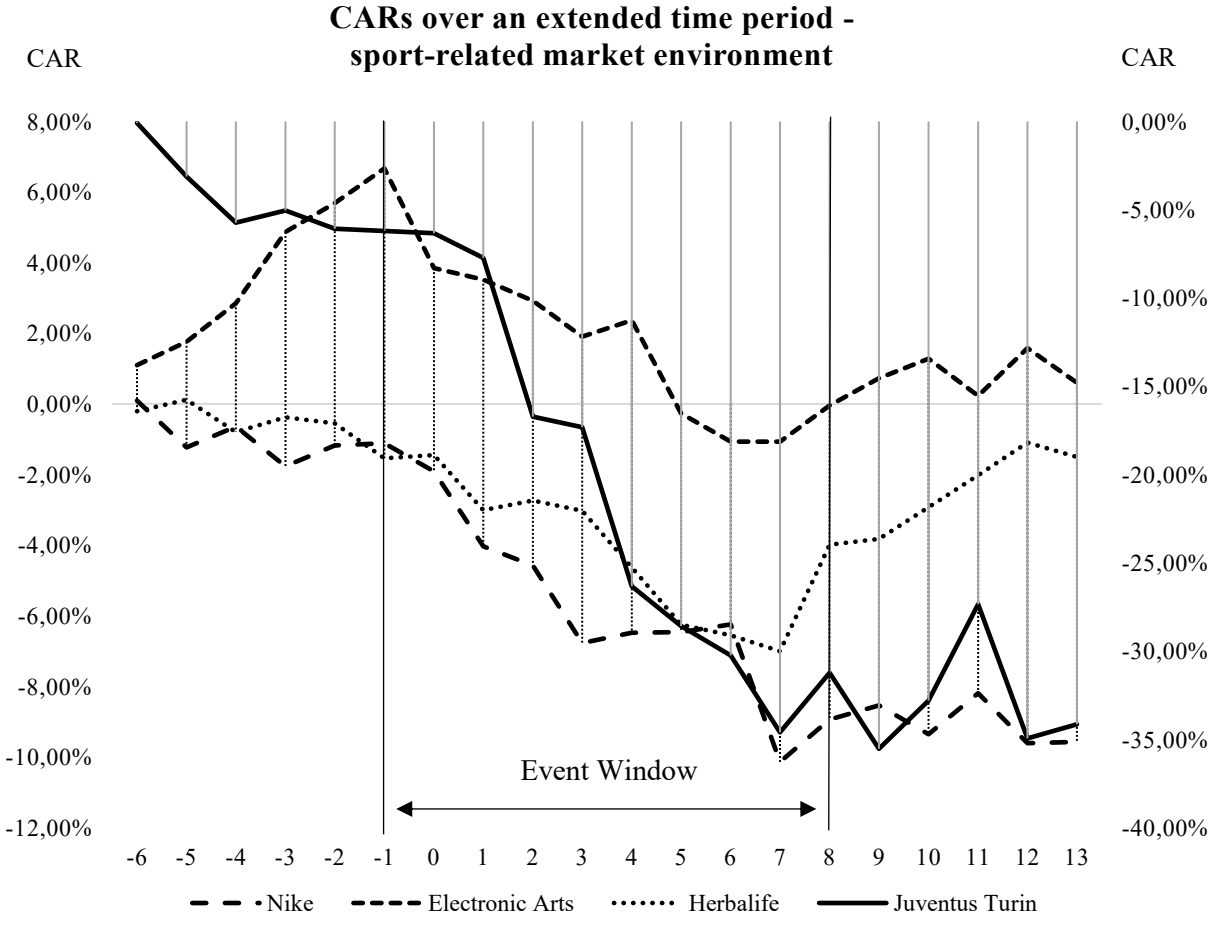

Figure 6: This figure shows the CARs of the sport-related sample over an extended time period, calculated with the MRM. On the primary axis Nike, Electronic Arts and Herbalife are displayed whereas the cumulated abnormal returns of Juventus Turin belong to the secondary axis.

5.3.2 Market efficiency

Contrary to the analysis of inefficient results caused by anticipation, this section is examining whether the stock prices directly incorporated the published information in the event window or if investors reacted with delay. The results from the sport-related sample showed that abnormal returns were scattered over the entire event window, however, the stock performance

of the companies in the sample does not exhibit a clear pattern of abnormal returns. For instance, only Electronic Arts recorded negative returns on event day 0. Therefore, it is possible that investors reacted slowly to the various media responses regarding the rape allegation scandal. Again, the event window included the full trading day after the last reaction that was identified as part of the rape allegation scandal. In order to control for the possibility that not all investor reactions regarding the event were incorporated in the event window, the week after the event window was examined (Table 17 in Appendix D). As it can also be seen in figure six, the reactions of the event seem to be incorporated in the event window. The CAR are developing much more stable in the aftermath of the event window. The results confirm this impression because none of the CAR are significantly different from zero in the tested period after the event window. The same applies to the daily abnormal returns, only Juventus Turin has two days with abnormal returns that are rejecting the null hypothesis of no abnormal returns. However, one of the two significant ARs is positive. Hence, the results do not refute the validation of the market efficiency assumption and the findings of significant negative impact of the rape allegation scandal can be attributed to the event.

5.3.3 Confounding events

This section is analysing whether any confounding events occurred in the tested time period. In order to control for unavoidable events in the estimation and event window, the affected days were excluded from the analysis.

The event period of ten days is rather long which increases the possibility of confounding events. The investigation revealed that two companies might have been influenced during the event. Firstly, on 3rd October 2018, Toyota made public that they have agreed on a strategic partnership with Soft Bank to create a joint venture that is aiming to create new mobility services. The president of Toyota announced that the partnership is an important milestone in transforming the company towards a "mobility-related services company" (Oshikiri 2018). In order to control for this event, the day before the announcement, the announcement day and the day after the release were excluded from the analysis. Secondly, on the last day of the event period, Samsung announced their new smartphone, the Galaxy A9. The day of the announcement as well as the day before the announcement were excluded from the analysis because this smartphone is the first one being attributed with a rear quad camera (four separate cameras on its backside) which possibly affected the stock performance of Samsung (Samsung 2018). The day after the announcement can be neglected since this day is not part of the event window.

For the estimation period, a window of 250 days was selected. Hence, the influence of confounding events is minor. However, the descriptive statistic presented in the data section show that compared to the other firms in the sample the stock of Juventus Turin deviates more often from the norm. In particular, the sport performance of Juventus Turin affected the stock price. However, this set characteristic gave no cause to eliminate the data for every game that Juventus Turin played in the past. Section three presented the transfer of Ronaldo from Real Madrid to Juventus Turin and showed the positive effect of the transfer on the stock price of Juventus. In order to make sure that the estimated returns are not biased by this transfer event, the analyses were also conducted without the stock performance in the transfer time frame (2nd June until 16th July 2018). The results show that the transfer did not influence the estimated returns for the event window and confirm the decision to apply an estimation window of 250 trading days.

6 Discussion of findings

6.1 Ronaldo rape allegation scandal

The results presented in section five show that the rape allegation scandal had a significant negative effect on the stock return of the sport-related market environment of Cristiano Ronaldo. However, no significant effect could be obtained for all other groups. This section is discussing the results and comparing the findings of the literature review to those of this dissertation.

The results of the sport-related group confirm the results of Louie, Kulik and Jacobsen (2001) that an endorser who can be blamed for the occurrence of a negative event is negatively affecting the stock performance. However, for the non-sport-related group this dissertation disproves the study and, thus, underlines the match-up theory regarding the product-athlete congruence (Kim and Na 2007). The stock performance of Juventus Turin suffered the most during the event window which leads to the assumption that a closer connection of the athlete to the company is impacting the economic performance during a negative event. This assumption is drawn because an athlete, and in particular a football player, can be most easily associated with his club and then in a second step with his sponsors. In this regard, it does not come as a surprise that both the group of the expired endorsement deals as well as the group of parent companies did not suffer significant abnormal returns during the event. Most companies from the group of expired relationships are multinational companies which are valued by their investors on how they face new challenges. Hence, it was likely that they are no longer associated with Ronaldo. The same applies to the group of the parent companies.

Regarding the distribution of the significant abnormal returns in the course of the event window, this dissertation confirmed Carrilla et al. (2013) that one should consider different dimensions when analysing the effect of a negative event on the brand. On none of the event days more than one company suffered significant abnormal returns which could be due to the fact that the different reactions during the event window do not have the same importance for all companies within the sport-related market environment. For instance, Electronic Arts had negative abnormal returns on event day five, the same day they made the decision to remove Cristiano Ronaldo from their FIFA 19 social media. This reaction from Electronic Arts does not necessarily affect all companies within the sports-related group and confirms the decision for a wider event window in order to capture the relevant responses of the Cristiano Ronaldo rape allegation scandal for each company.

The study of Lee, Kwak and Moore (2013) gave rise to the assumption that through moral reasoning strategies the investors could have tried to justify the immoral action. However, the results show the immense power of the #metoo movement which strengthened the public opinion that no arguments could possibly be voiced to try justify a rape. It is interesting that the impact of the allegation had such a negative effect on the stock value of the company's endorsed by Ronaldo since it is not confirmed that the allegations are true. Thus, this event points out the risks of athlete endorsement and reminds investors as well as companies to keep in mind that off-field transgression can cause losses. This is an important finding taken into consideration that Hood (2012) did not find any CAR and AR that are significantly different from zero for the infidelity scandal of Tiger Woods.

The literature review emphasised the increasing importance of social media for athlete endorsement. Hence, it was assumed that if the company's stock performance deteriorates the amount of people following Ronaldo on Instagram will also be affected. However, Ronaldo's number of followers has increased on every day within the event period. This gives reason to believe that the event did not have a negative impact on the marketing activities of companies using Ronaldo's social media presence.

6.2 Financial impact on the sport-related market environment

The results indicate that the sport-related market environment suffered significant losses. This section measures the magnitude of the financial losses of the sport-related sample. The market capitalisation of the day before the event took place was used for each company and the CAR of the MRM was used to quantify the amount of losses. On an aggregated basis, the financial impact of the event on the sport-related market environment of Cristiano Ronaldo is $ -20,45

billion. Table seven shows the financial impact for each company and for the sport-related group.

Financial impact on sport-related market environment

	Rape Allegation Scandal	
Company	CAR	Loss ($ mil.)
Nike	-12%	16 543,77
Electronic Arts	-10%	3 455,06
Juventus Turin	-26%	456,05
Herbalife	-5%	393,02
Total		20 454,88

Table 8: This table shows the financial impact of the Cristiano Ronaldo rape allegation scandal on his sport related market environment. The CAR from the MRM and the market capitalisation of each company on the day before the event took place serve as a basis for this calculation.

7 Conclusion

This dissertation aimed at measuring the financial impact of the Cristiano Ronaldo rape allegation scandal on his market environment. It confirms the general findings of the literature on celebrity endorsement and scandals while simultaneously opening up a new field of research for the area of athlete endorsement. Concerning the latter, this dissertation is the first empirical work revealing a significant negative stock market reaction by off-field transgression of an athlete endorser among his endorsed companies and his club Juventus Turin. In contrast to similar studies, this dissertation included the increasing importance of social media as a tool for athlete endorsement in the analysis. Previous literature almost exclusively focusses on the positive sides of athlete endorsement and the reaction of consumer behavior. The fact that the amount spent on endorsement deals increased immensely in the last years while the number of publicly known scandals rose constantly underlines the significance of the findings made in this dissertation.

To test whether or not Ronaldo's market environment suffered significant losses during the event, this dissertation applied an event study methodology by using stock market data retrieved from Thomson Reuters. With both models, the MRM and CMRM, the dissertation was able to confirm that the rape allegation scandal of Ronaldo had a negative impact on his sport-related market environment. His club Juventus Turin showed the most negative stock performance of the sport-related group. The findings were confirmed by the robustness tests conducted through non-parametric tests. In the MRM, the respective stock market index of the analysed company served as the benchmark. In order to also conduct a robustness check within the MRM, the respective stock market index was replaced by using the competitors as the benchmark. Again,

the robustness test confirmed the findings. For all other groups analysed (non-sport-related, expired and parent companies) such relation could not be identified and gives reason to assume that the findings from the literature that product-athlete congruence has an influence on the reaction of consumers can also be transferred to the reaction of investors. Overall, the financial losses of the sport-related market environment of Ronaldo amounted to up to $ -20,45 billion. These findings should not only make the investors and the endorsed companies but also researcher in that field more aware of the risks involved in athlete endorsement. The use of athlete endorsement can, besides the increase of popularity, also lead to devastating consequences in particular for small companies, and, thus, needs to be considered in the decision for this marketing tool. Due to the increased importance of social media for the effectiveness of athlete endorsement, this dissertation additionally tested the development of Ronaldo's Instagram in the course of the event. To do so, a difference-in-difference approach was conducted. The amount of followers increased on every single day of the event window but at a lower rate compared to the estimation window. Different from what was expected, this finding is contrary to the identified losses of the sport-related market environment. However, for the comparison of Ronaldo with Neymar, the difference-in-difference estimator was significantly negative at 1% level, and, thus, indicating a negative influence of the event on Ronaldo's Instagram follower development. Nevertheless, this finding could not be confirmed by the analyses between Ronaldo and Messi. In addition, the robustness test, which used a larger estimation window, furthermore did not support any relationship between the event and the development of Ronaldo's Instagram followers. Therefore, this dissertation could not outline a relation between the results of the stock market reaction and the reaction of the Instagram followers.

Despite the useful findings of this dissertation, there are also some limitations that need to be addressed albeit these limitations may simultaneously show areas for future research.

Due to the limited number of publicly traded companies that are endorsed by Ronaldo, the sample size of the analysed groups was relatively small. This makes it difficult to generalise the results for the whole group of sport-related companies. In particular, the influence of the event on Cristiano Ronaldo's own brand CR7 would have been interesting to investigate. Furthermore, the multiple market reactions during the event complicated the allocation of these reactions to the stock performance of the market environment. In addition, the information accessible to the endorsement deals were limited. This made it difficult to conduct more detailed analysis between the characteristics of the endorsement deal and the respective stock market reaction. In particular, the economic size and the period of the contract could have been valuable

indicators to make more profound statements. Further, the endorsement relation between Ronaldo and the companies could not be identified in detail, and, thus, it could not be clearly identified whether Ronaldo is advertising for the company or being seen as a brand ambassador. In future research, the investigation of the presented characteristics can give more fruitful insights into the reaction of investors to a negative event. This dissertation is solely focusing on the off-field transgression of Ronaldo and, thus, opens up the field for further research on the comparison of on-field transgression and off-field transgression in the area of athlete endorsement.

Throughout his career, Ronaldo triggered more scandals, such as the tax fraud allegations. However, this dissertation limits its investigations to one scandal and thereby confines the finding to comparable cases. In addition, the focus of this work lies on the market environment of Ronaldo. An interesting field of further research could be to investigate whether market competitors could profit from the negative perception of the companies sponsoring Ronaldo.

Reference List

Agrawal, J.; Kamakura, Wagner A. (1995): The Economic Worth of Celebrity Endorsers: An Event Study Analysis. In *Journal of Marketing* 59 (3), p. 56.

Badenhausen, K. (2018): The World's 100 Highest-Paid Athletes 2018: Behind The Numbers. Forbes. Available online at https://www.forbes.com/sites/kurtbadenhausen/2018/06/05/the-worlds-100-highest-paid-athletes-2018-behind-the-numbers/#546b878b4dd0, checked on 4/22/2019.

BBC (2018): Cristiano Ronaldo rape allegation: Las Vegas police reopen case. BBC. Available online at https://www.bbc.com/news/world-europe-45712777, checked on 4/22/2019.

Benston, G. J. (1982): Accounting numbers and economic values. In *Antitrust Bulletin* (1), pp. 161–215.

Bhattacharjee, A.; Berman, J.; Reed, A. (2013): Tip of the Hat, Wag of the Finger: How Moral Decoupling Enables Consumers to Admire and Admonish. In *J Consum Res* 39 (6), pp. 1167–1184.

Brown, S. J.; Warner, J. (1985): Using daily stock returns. In *Journal of Financial Economics* 14 (1), pp. 3–31.

Carlson, B. D.; Donavan, D. T. (2008): Concerning the effect of athlete endorsements on brand and team-related intentions. In *Sport Marketing Quarterly* 17 (3), pp. 154–162.

Carrillat, F. A.; D'astous, A.; Lazure, J. (2013): For Better, for Worse? In *Journal of Advertising Research* 53 (1), pp. 15–30. DOI: 10.2501/JAR-53-1-015-030.

Chung, K..; Derdenger, T.; Srinivasan, K.(2013): Economic Value of Celebrity Endorsements: Tiger Woods' Impact on Sales of Nike Golf Balls. In *Marketing Science* 32 (2), pp. 271–293. DOI: 10.1287/mksc.1120.0760.

Conrad, E. (1995): Caution: Falling Idol; Ad Firms Growing Wary of Tainted Sport Heroes. In *Pittsburgh Post-Gazette*, October 8, Section C2.

Cunningham, N.; Bright, L. (2012): The tweet is in your court. Measruing attitude towards athlete endorsements in social media. In *International Journal of Integrated Marketing Communications* (74), pp. 73–87.

Der Spiegel staff (2018): Her Name Is Kathryn. The Woman Who Accuses Ronaldo of Rape. Der Spiegel. Available online at https://www.spiegel.de/international/cristiano-ronaldo-kathryn-mayorga-the-woman-who-accuses-ronaldo-of-rape-a-1230634.html, checked on 4/22/2018.

Dolley, J. (1933): Characteristics and procedure of common stock split-ups. In *Harvard Business Review* 11, pp. 316–326.

Dutta, A. (2014): Parametric and Nonparametric Event Study Tests: A Review. In *International Business Research* 7 (12), pp. 136–142.

Erdogan, B. (1999): Celebrity Endorsement: A Literature Review. In *Journal of Marketing Management* 15 (4), pp. 291–314.

European Commission (2014): Expert Groups (EU Work Plan for sport 2014-2017). Available online at https://ec.europa.eu/sport/policy/cooperation/expert-groups-2014-2017_en, checked on 4/22/2019.

Fama, E. F..; Fisher, L.; Jensen, M. C.; Roll, R. (1969): The Adjustment of Stock Prices to New Information. In *International Economic Review* 10 (1), p. 1.

Fares, M. (2018): Sponsors EA and Nike say concerned about Ronaldo rape claims. Reuters. Available online at https://www.reuters.com/article/soccer-ronaldo-sponsors/sponsors-ea-and-nike-say-concerned-about-ronaldo-rape-claims-idUSL2N1WK225, checked on 4/22/2018.

Farrelly, F.; Quester, P. (2005): Investigating large-scale sponsorship relationships as co-marketing alliances. In *Business Horizons* 48 (1), pp. 55–62.

Fink, J. S.; Parker, H. M.; Brett, M.; Higgins, J. (2009): Off-Field Behavior of Athletes and Team Identification: Using Social Identity Theory and Balance Theory to Explain Fan Reactions. In *Journal of Sport Management* 23 (2), pp. 142–155.

Forbes (2018): The World´s highest-paid athletes. Available online at https://www.forbes.com/athletes/#73f2e03f55ae, checked on 4/19/2019.

Garcia, A. (2018): Cristiano Ronaldo left out of Portugal squad for games vs. Poland, Scotland. ESPN. Available online at http://www.espn.com/soccer/portugal/story/3656842/cristiano-ronaldo-left-out-of-portugal-squad-for-games-vs-poland-and-scotland, checked on 4/22/2019.

Hani, S.; Marwan, A.; Andre, A. (2018): The effect of celebrity endorsement on consumer behaviour: Case of the Lebanese jewellery industry. In *Arab Economic and Business Journal* 13 (2), pp. 190–196.

Hicks, G. (2012): The first adman. Thomas Bish and the birth of modern advertising. Brighton: Victorian Secrets.

Hood, M. (2012): The Tiger Woods scandal: a cautionary tale for event studies. In *Managerial Finance* 38 (5), pp. 543–558.

Kenmare, J. (2018): The Amount Of Money Cristiano Ronaldo Earns From A Single Instagram Post Is Seriously Insane. Sport Bible. Available online at http://www.sportbible.com/football/news-reactions-how-much-cristiano-ronaldo-earns-from-a-single-instagram-post-20180727, checked on 4/22/2019.

Kim, Y.; Na, J. (2007): Effects of celebrity athlete endorsement on attitude towards the product: the role of credibility, attractiveness and the concept of congruence. In *International Journal of Sports Marketing and Sponsorship* 8 (4), pp. 23–33.

KMPG Football Benchmark (2018): From Madrid to Turin: Ronaldo Economics. KMPG. Available online at https://assets.kpmg/content/dam/kpmg/nl/pdf/2018/advisory/ronaldo-economics.pdf, checked on 4/22/2019.

Lawless, J. (2018): Cristiano Ronaldo Is Officially The Most Followed Person On Instagram. Sport Bible. Available online at http://www.sportbible.com/football/news-cristiano-ronaldo-is-officially-the-most-followed-person-on-instagram-20181029, checked on 4/22/2019.

Lawrence, B. (2013): Why big brands spent so much money on athlete endorsement. Opendorse. Available online at http://opendorse.com/blog/why-big-brands-spend-so-much-on-athleteendorsements, checked on 4/12/2019.

Lee, J.; Kwak, D.; Moore, D. (2015): Athletes' Transgressions and Sponsor Evaluations: A Focus on Consumers' Moral Reasoning Strategies. In *Journal of Sport Management* 29 (6), pp. 672–687.

Leeds, M. (2010): Is bad news always bad? The impact of Floyd Landis's rise and fall on Phonak. In *Applied Economics Letters* 17 (8), pp. 805–808. DOI: 10.1080/13504850802464109.

Louie, T.; Kulik, R.; Jacobsen, Robert (2001): When bad things happen to the endorsers of good products. In *Marketing Letters* 12 (1), pp. 13–23.

Louie, T.; Obermiller, C. (2002): Consumer Response to a Firm's Endorser (Dis) Association Decisions. In *Journal of Advertising* 31 (4), pp. 41–52.

MacInnes, P. (2018): Cristiano Ronaldo's lawyers claim rape allegation documents have been altered. The Guardian. Available online at https://www.theguardian.com/football/2018/oct/10/cristiano-ronaldo-lawyers-rape-allegation-documents-altered, checked on 4/22/2019.

MacKinlay, A. (1997): Event studies in economics and finance. In *Journal of Economic Literature* 35 (1), pp. 13–39.

McGladdery, M. (2018): Cristiano Ronaldo Removed From FIFA 19 Social Media As EA 'Monitor' Rape Allegation. Sport Bible. Available online at http://www.sportbible.com/technology/gaming-c-ronaldo-removed-from-fifa-social-media-following-rape-allegation-20181005, checked on 4/22/2019.

McWilliams, A.; Siegel, D. (1997): Event studies in management research: Theoretical and empirical issues. In *Academy of Management Journal* 40 (3), pp. 626–657.

Ohanian, R. (1991): The impact of celebrity spokespersons' perceived image on consumers' intention to purchase. In *Journal of Advertising Research* 31 (1), pp. 46–54.

Oler, D..; Harrison, J.; Allen, M. (2008): The danger of misinterpreting short-window event study findings in strategic management research: an empirical illustration using horizontal acquisitions. In *Strategic Organization* 6 (2), pp. 151–184.

Oshikiri, T. (2018): Toyota and SoftBank tie up to offer new mobility services. Available online at https://asia.nikkei.com/Business/Business-deals/Toyota-and-SoftBank-tie-up-to-offer-new-mobility-services, checked on 4/22/2019.

Riaz, A. (2019): EA Sports Has Dropped Cristiano Ronaldo From The New FIFA 19 Cover. Sport Bible. Available online at http://www.sportbible.com/news/gaming-ea-sports-has-dropped-ronaldo-from-the-new-fifa-19-cover-20190207, checked on 4/22/2019.

Samsung (2018): Live in the moment with the Galaxy A9. Available online at https://news.samsung.com/global/live-in-the-moment-with-the-galaxy-a9, checked on 4/22/2019.

Shimp, T.; Andrews, J. (2013): Advertising, promotion, and other aspects of integrated marketing communications. 9th ed. Mason, Ohio: South-Western Cengage Learning.

Silvera, D.; Austad, B. (2004): Factors predicting the effectiveness of celebrity endorsement advertisements. In *European Journal of Marketing* 38 (11/12), pp. 1509–1526.

The Economist (2018): American business and #MeToo. The Economist (Behind closed doors). Available online at https://www.economist.com/business/2018/09/27/american-business-and-metoo, checked on 4/22/2019.

Till, B.; Shimp, T. (1998): Endorsers in Advertising: The Case of Negative Celebrity Information. In *Journal of Advertising* 27 (1), pp. 67–82.

transfermarkt (2019b): Overview of victories. Available online at https://www.transfermarkt.com/lionel-messi/erfolge/spieler/28003, checked on 4/22/2019.

transfermarkt (2019a): Overview of victories. Available online at https://www.transfermarkt.com/cristiano-ronaldo/erfolge/spieler/8198, checked on 4/22/2019.

Yeon., Hee; Chung, Jae-Eun (2011): Consumer purchase intention for organic personal care products. In *Journal of Consumer Marketing* 28 (1), pp. 40–47.

Yoon, S.; Shin, S. (2017): The role of negative publicity in consumer evaluations of sports stars and their sponsors. In *Journal of Consumer Behaviour.* 16 (4), pp. 332–342.

Appendices

Appendix A: Social media overview Ronaldo

Geographical distribution of Facebook followers: Ronaldo, Real Madrid, and Juventus Turin (in million)

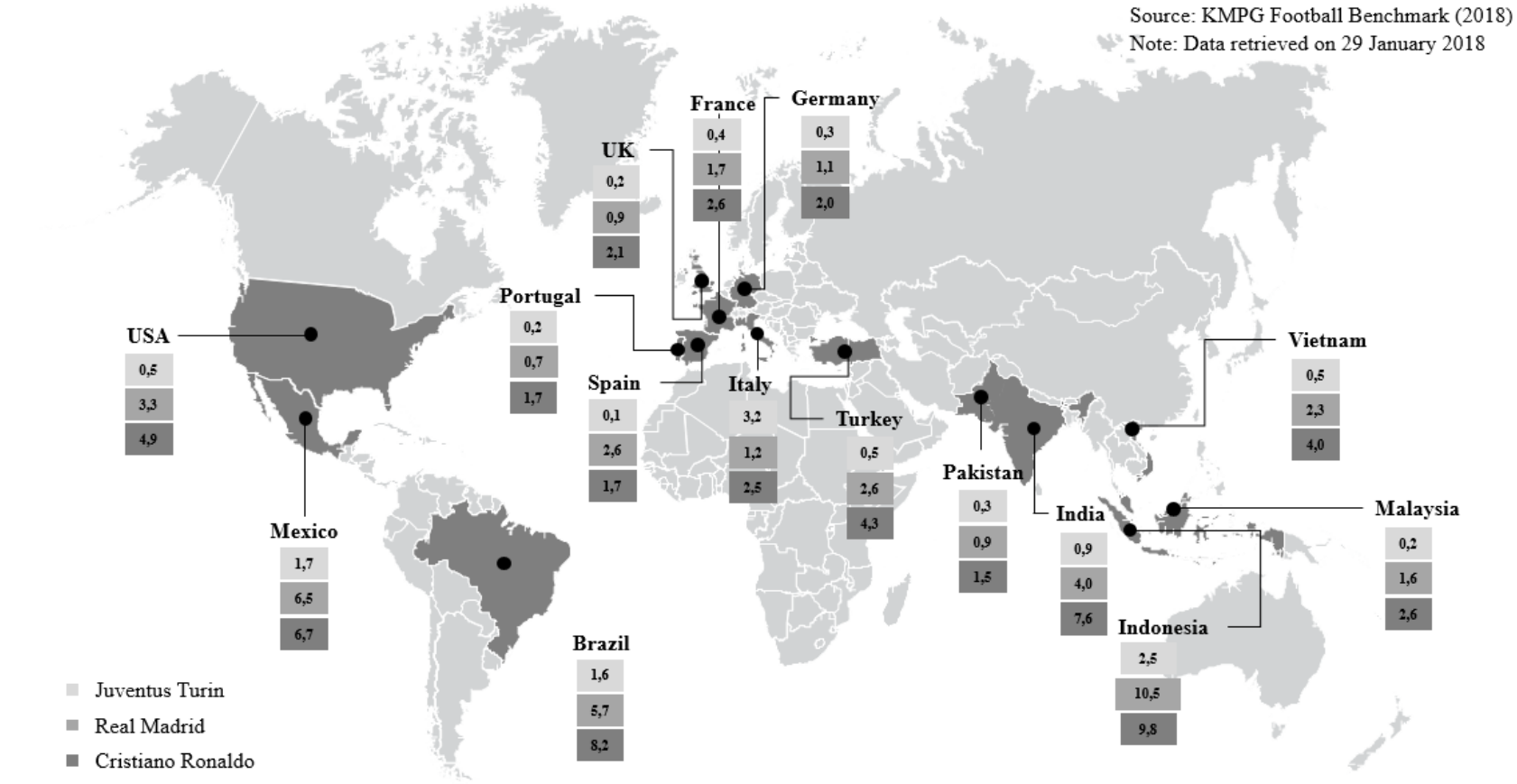

Figure 1: This figure shows the geographical distribution of Facebook followers of Ronaldo, Real Madrid and Juventus Turin and underlines the immense marketing potential of Cristiano Ronaldo for his new club Juventus Turin.

Appendix B: Market environment Overview Cristiano Ronaldo

Market Environment Overview Cristiano Ronaldo

Company	Sample	Current/Expired endorsement deals	Listed	Parent Company	Parent listed	Comment	Benchmark	Respective risk-free rate
Abbott Laboratories	sport non-related	Expired	Yes	-	-	-	S&P 500	US 1M T-Bill
Altice	sport non-related	Current	Yes	-	-	-	Euronext 150	DE 1M Bund
American Tourister	sport non-related	Current	No	-	-	-	-	
Banco Espirito Santo	sport non-related	Expired	No	-	-	Splitted	-	
Castrol	sport non-related	Expired	No	BP	Yes	-	FTSE 100	GB 1M T-Bill
Clear Shampoo	sport non-related	Expired	No	Unilever	*Yes*	split parts listed		
Dazn	sport-related	Current	No	-	-	-	-	
Eden Parfums	sport non-related	Current	No	I. Pharmaceuticals	No	-	-	
Egyptian Steel	sport non-related	Expired	No	-	-	-	-	
Electronic Arts	sport-related	Current	Yes	-	-	-	S&P 500	US 1M T-Bill
Elite team	sport non-related	Current	No	-	-	-	-	
Emirates Airline	sport non-related	Expired	No	-	-	-	-	
Emporio Armani	sport non-related	Expired	No	-	-	-	-	
Exness	sport non-related	Current	No	-	-	-	-	
Herbalife	sport-related	Current	Yes	-	No	-	S&P 500	US 1M T-Bill
Hotel Group Pestana	sport non-related	Current	No	-	No	-	-	
Jacob and Co.	sport non-related	Expired	No	-	-	-	-	
JBS	sport non-related	Expired	No	-	-	-	-	
Juventus Turin F.C	sport-related	Current	Yes	-	-	-	FTSE MIB	IT 1M BOT
KFC	sport non-related	Expired	No	Yum!Brands	Yes	-	S&P 500	US 1M T-Bill
Konami	sport-related	Expired	Yes	-	-	-	Nikkei 225	JP 1M TDB
MTG Co LTd	sport-related	Current	*Yes*	-	-	Listed in July18	-	
Nike	sport-related	Current	Yes	-	No	-	S&P 500	US 1M T-Bill
PanzerGlass	sport non-related	Current	No	JB Holding	No	-	-	

PokerStars.com	sport-related	Expired	No	-	-	-	-	
Samsung	sport non-related	Expired	Yes	-	-	-	KOPSI200	KR 1Y KTB
Save the Children	sport non-related	Expired	No	-	-	NGO	-	
Smaaash Entertainment	sport-related	Current	No	-	-	-	-	
Soccerade	sport-related	Expired	No	-	-	Bankruptcy	-	
Sportlobster	sport-related	Expired	No	-	-	-	-	
TAG Heuer	sport non-related	Expired	No	-	-	-	-	
Toyota	sport non-related	Expired	Yes	-	-	-	Nikkei 225	JP 1M TDB
XTrade	sport non-related	Expired	No	-	-	-	-	
Yamamay	sport non-related	Current	No	-	-	-	-	
ZTE	sport non-related	Expired	*Yes*	-	-	Illiquid	-	

Table 1: This table shows the characteristics of the identified market environment of Cristiano Ronaldo. These characteristics served as a basis for the allocation of the firms to the different categories, analysed in this dissertation.

Appendix C: Descriptive Statistics

Descriptive Statistics of the abnormal returns from the estimation window - sport-related market environment

	Nike		Electronic Arts		Herbalife		Juventus Turin		sport-related	
Statistics	MRM	CMRM	MRM	CMRM	MRM	CMRM	MRM	CMRM	MRM	CMRM
Mean	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Median	-0,0011	-0,0004	0,0001	0,00049	-0,0013	-0,0011	-0,0008	-0,0027	-0,0004	-0,0007
Sample Variance	0,0002	0,0002	0,0002	0,00033	0,0003	0,0003	0,0008	0,00089	0,0001	0,0004
Standard Deviation	0,0132	0,0151	0,0156	0,0182	0,0175	0,0181	0,02826	0,02978	0,00945	0,0210
Standard Error	0,0008	0,0010	0,0010	0,00115	0,0011	0,0012	0,00179	0,00188	0,0006	0,0007
Largest(1)	0,1091	0,1092	0,0695	0,06938	0,1258	0,1283	0,15833	0,16103	0,04073	0,1610
Smallest(1)	-0,0315	-0,0499	-0,0921	-0,0981	-0,0962	-0,0979	-0,1061	-0,0928	-0,0328	-0,0981
Excess Kurtosis	18,48	11,31	6,60	4,60	20,14	17,87	5,75	5,07	2,22	0,47
Skewness	2,58	1,50	-0,66	-0,66	2,01	1,81	0,92	0,98	1,17	1,01

Table 1: This table shows the descriptive statistics for the sport-related market environment, calculated with the MRM and CMRM.

Descriptive Statistics of the abnormal returns from the estimation window- remaining endorsement deals

	Abbott Laboratories		Altice		Konami		Toyota		Samsung	
Statistics	MRM	CMRM	MRM	CMRM	MRM	CMRM	MRM	CMRM	MRM	CMRM
Mean	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Median	-0,0006	0,0001	-0,0003	-0,0016	-0,0004	-0,0009	-0,001	0,0001	-0,0006	0,0002
Sample Variance	0,0001	0,0001	0,0032	0,0033	0,0002	0,0003	8,1E-05	0,0001	0,0001	0,0003
Standard Deviation	0,0082	0,0117	0,0568	0,05748	0,01429	0,0183	0,009	0,0118	0,0109	0,0175
Standard Error	0,0005	0,0007	0,0036	0,00364	0,0009	0,0012	0,00057	0,0007	0,0007	0,0011
Largest(1)	0,0420	0,0407	0,6087	0,61379	0,04564	0,068	0,04136	0,0389	0,0304	0,0408
Smallest(1)	-0,0222	-0,0493	-0,2299	-0,226	-0,0513	-0,0662	-0,0255	-0,0357	-0,0314	-0,0509
Excess Kurtosis	4,36	2,38	57,30	55,44	0,91	1,13	1,96	0,96	0,33	-0,03
Skewness	0,94	-0,46	5,29	5,14	0,06	-0,04	0,57	0,23	0,08	-0,03

Table 2: This table shows the descriptive statistics for the remaining endorsement deals, calculated with the MRM and CMRM.

Descriptive Statistics of the abnormal returns from the estimation window – parent companies

	BP		Yum!Brands	
Statistics	MRM	CMRM	MRM	CMRM
Mean	0,0000	0,0000	0,0000	0,0000
Median	-0,0008	-0,0002	-0,0001	-0,0001
Sample Variance	0,0001	0,0002	0,0001	0,0001
Standard Deviation	0,0086	0,0123	0,0095	0,0114
Standard Error	0,0005	0,0008	0,0006	0,0007
Largest(1)	0,0227	0,0383	0,0646	0,0642
Smallest(1)	-0,0257	-0,0359	-0,0689	-0,0752
Excess Kurtosis	0,35	0,65	19,41	12,23
Skewness	0,13	0,02	-0,11	-0,66

Table 3: This table shows the descriptive statistics for the parent companies, calculated with the MRM and CMRM.

Appendix D: Event study results

Abnormal return and cumulative abnormal return - current sport-related market environment

		MRM				CMRM			
Company	Event day	AR	T-Stat	CAR	T-Stat	AR	T-Stat	CAR	T-Stat
Electronic Arts	-1	1,0%	0,63	1,0%	0,63	0,9%	0,50	0,9%	0,50
	0	-2,8%	-1,80*	-1,8%	-0,83	-2,5%	-1,35	-1,6%	-0,60
	1	-0,3%	-0,21	-2,2%	-0,80	-0,4%	-0,24	-2,0%	-0,63
	2	-0,6%	-0,38	-2,8%	-0,88	-0,6%	-0,32	-2,6%	-0,71
	3	-1,0%	-0,65	-3,8%	-1,08	-2,1%	-1,13	-4,6%	-1,14
	4	0,5%	0,30	-3,3%	-0,87	-0,3%	-0,15	-4,9%	-1,10
	5	-2,6%	-1,68*	-6,0%	-1,44	-2,8%	-1,51	-7,7%	-1,59
	6	-0,8%	-0,51	-6,8%	-1,53	-1,0%	-0,57	-8,7%	-1,69*
	7	0,0%	0,00	-6,8%	-1,44	-4,0%	-2,18**	-12,7%	-2,32**
	8	1,0%	0,66	-5,7%	-1,16	-1,5%	-0,82	-14,2%	-2,46**
Herbalife	-1	-1,0%	-0,57	-1,0%	-0,57	-1,0%	-0,57	-1,0%	-0,57
	0	0,1%	0,05	-0,9%	-0,36	0,3%	0,15	-0,8%	-0,30
	1	-1,6%	-0,89	-2,5%	-0,81	-1,6%	-0,89	-2,4%	-0,76
	2	0,3%	0,15	-2,2%	-0,62	0,3%	0,15	-2,1%	-0,58
	3	-0,3%	-0,16	-2,5%	-0,63	-0,8%	-0,44	-2,9%	-0,72
	4	-1,6%	-0,92	-4,1%	-0,95	-2,0%	-1,09	-4,9%	-1,10
	5	-1,6%	-0,92	-5,7%	-1,23	-1,7%	-0,93	-6,6%	-1,37
	6	-0,3%	-0,17	-6,0%	-1,21	-0,4%	-0,23	-7,0%	-1,36
	7	-0,5%	-0,26	-6,5%	-1,23	-2,4%	-1,33	-9,4%	-1,73*
	8	3,0%	1,72*	-3,4%	-0,62	1,8%	0,98	-7,6%	-1,33
Juventus Turin	-1	-0,1%	-0,04	-0,1%	-0,04	-3,6%	-1,21	-3,6%	-1,21
	0	-0,1%	-0,05	-0,3%	-0,06	-0,6%	-0,19	-4,2%	-0,99
	1	-1,4%	-0,49	-1,7%	-0,34	-1,6%	-0,54	-5,8%	-1,12
	2	-9,0%	-3,18***	-10,7%	-1,88*	-8,2%	-2,74***	-14,0%	-2,34**
	3	-0,6%	-0,21	-11,2%	-1,78*	-1,1%	-0,38	-15,1%	-2,26**
	4	-9,0%	-3,19***	-20,3%	-2,92***	-10,2%	-3,43***	-25,3%	-3,46***
	5	-2,2%	-0,79	-22,5%	-3,00***	-4,5%	-1,51	-29,8%	-3,77***
	6	-1,7%	-0,59	-24,2%	-3,02***	-0,7%	-0,22	-30,5%	-3,61***
	7	-4,3%	-1,54	-28,5%	-3,36***	-5,9%	-1,99**	-36,4%	-4,06***
	8	3,4%	1,19	-25,2%	-2,81***	1,7%	0,55	-34,8%	-3,68***
Nike	-1	0,1%	0,05	0,1%	0,05	0,0%	0,00	0,0%	0,00
	0	-0,8%	-0,60	-0,7%	-0,39	-0,5%	-0,34	-0,5%	-0,24
	1	-2,1%	-1,60	-2,9%	-1,25	-2,2%	-1,46	-2,7%	-1,04
	2	-0,5%	-0,41	-3,4%	-1,29	-0,5%	-0,35	-3,3%	-1,08
	3	-2,2%	-1,67*	-5,6%	-1,89*	-3,0%	-2,00**	-6,3%	-1,86*
	4	0,3%	0,22	-5,3%	-1,64	-0,3%	-0,19	-6,6%	-1,77
	5	0,0%	0,02	-5,3%	-1,51	-0,1%	-0,05	-6,6%	-1,66*
	6	0,2%	0,16	-5,1%	-1,36	0,0%	0,02	-6,6%	-1,54
	7	-3,9%	-2,95***	-9,0%	-2,26**	-7,0%	-4,64***	-13,6%	-3,00***
	8	1,2%	0,91	-7,8%	-1,86*	-0,8%	-0,52	-14,4%	-3,01***

Table 1: This table shows the individual ARs and CARs of the sport-related market environment during the Cristiano Ronaldo rape allegation scandal and indicates whether the results are significant or not.

Average Cumulative Standardized Abnormal Return - sport-related endorsement deals

Sample	Event Day	Date	MRM		CMRM	
			ACSAR	Z	ACSAR	Z
current sport-related endorsement deals	-1	28/09/2018	0,04	0,06	-0,02	-0,04
	0	01/10/2018	-0,53	-0,91	-0,38	-0,65
	1	02/10/2018	-0,95	-1,64	-0,80	-1,39
	2	03/10/2018	-0,93	-1,60	-0,78	-1,36
	3	04/10/2018	-1,19	-2,07**	-1,23	-2,13**
	4	05/10/2018	-1,14	-1,98**	-1,31	-2,27**
	5	08/10/2018	-1,38	-2,40**	-1,53	-2,64***
	6	09/10/2018	-1,35	-2,35**	-1,52	-2,63***
	7	10/10/2018	-1,62	-2,8***	-2,30	-3,98***
	8	11/10/2018	-1,20	-2,07**	-2,22	-3,84***

Table 2: This table shows the average cumulative standardized abnormal returns of the current sport-related endorsement deals during the defined event window of the Cristiano Ronaldo rape allegation scandal, calculated with the MRM and CMRM.

Non Parametric Test - Generalized sign test

Sample	MRM	CMRM
Sport-related market environment	2,17**	3,89***
Non-sport-related-market environment	0,6	0,15
Expired endorsement deals	0	1,23
Parent companies	1,84*	1,06

Table 3: This table shows the results of the generalized sign test. For the sport-related market environment the fraction of ARs in the event window is significantly different from the fraction in the estimation window. This is caused by the amount of negative ARs in the event window, whereas for the parent companies the significance with the MRM is caused by the amount of positive ARs in the event window.

Non Parametric Test - Generalized sign test

Company	MRM	CMRM
Nike	0,28	1,82*
Electronic Arts	1,29	2,63***
Herbalife	0,89	1,09
Juventus Turin	2,43**	2,24**

Table 4: This table shows the results of the generalized sign test for the sport-related market environment on an individual basis.

Non Parametric Test - Wilcoxon signed rank test

	MRM			CMRM		
Sample	W+	W-	Z	W+	W-	Z
Sport-related market environment	186	634	3,01***	81	739	4,42***
Non-sport-related-market environment	30	25	$W_{stat}>W_{critical}$	39	39	$W_{stat}>W_{critical}$
Expired endorsement deals	401	419	0,12	401	419	0,12
Parent companies	283	182	$W_{stat}>W_{critical}$	143	322	$W_{stat}<W_{critical}$*

Table 5: This table shows the results of the Wilcoxon signed-rank test.

Nike with respective competitor as the benchmark in the MRM								
	T-test of Nike's daily ARs				T-test for Nike's CARs			
Event day	Adidas	Asics	Under Armour	S&P 500	Adidas	Asics	Under Armour	S&P 500
-1	0,03	-0,14	-0,06	0,05	0,03	-0,14	-0,06	0,05
0	-0,55	-0,29	-0,30	-0,60	-0,36	-0,30	-0,26	-0,39
1	-1,52	-1,52	-1,09	-1,60	-1,18	-1,12	-0,84	-1,24
2	-0,38	-0,31	-0,51	-0,41	-1,21	-1,12	-0,98	-1,28
3	-1,84*	-2,16**	-1,77*	-1,67*	-1,90*	-1,97**	-1,67*	-1,89*
4	-0,14	-0,20	0,05	0,22	-1,80*	-1,88*	-1,50	-1,64
5	0,07	-0,05	0,00	0,02	-1,63	-1,70*	-1,39	-1,51
6	0,13	0,18	0,01	0,16	-1,48	-1,60	-1,30	-1,35
7	-4,40***	-4,80***	-4,28***	-2,95***	-2,86***	-3,02***	-2,65***	-2,26**
8	-0,47	-0,33	-0,51	0,91	-2,86***	-3,04***	-2,68***	-1,85*

Table 6: This table shows the ARs and CARs of Nike, calculated with the MRM. The respective market index was replaced by using the competitors as the benchmark to derive ARs and CARs. Adidas, Asics and Under Armour were identified as competitor group.

Juventus Turin with respective competitor as the benchmark in the MRM

	T-test of Juventus's daily ARs				T-test of Juventus's CARs			
Event day	AS Roma	Lazio Roma	BVB	FTSE MIB	AS Roma	Lazio Roma	BVB	FTSE MIB
-1	-1,07	-1,14	-1,04	-0,04	-1,07	-1,14	-1,04	-0,04
0	-0,32	-0,01	-0,57	-0,05	-0,98	-0,81	-1,14	-0,06
1	-0,55	-0,33	-0,71	-0,49	-1,12	-0,85	-1,34	-0,34
2	-2,83***	-2,75***	-2,82***	-3,18***	-2,38**	-2,11**	-2,57**	-1,88*
3	-0,33	-0,32	-0,47	-0,21	-2,28**	-2,03**	-2,51**	-1,78*
4	-3,35***	-3,06***	-3,40***	-3,19***	-3,45***	-3,10***	-3,68***	-2,92***
5	-1,27	-1,25	-1,50	-0,79	-3,68***	-3,34***	-3,97***	-3,00***
6	-0,25	-0,26	-0,11	-0,59	-3,53***	-3,22***	-3,75***	-3,02***
7	-2,06**	-2,06**	-1,65*	-1,54	-4,01***	-3,75***	-4,09***	-3,36***
8	0,60	0,74	0,61	1,19	-3,67***	-3,30***	-3,69***	-2,81***

Table 7: This table shows the ARs and CARs of Juventus Turin, calculated with the MRM. The respective market index was replaced by using the competitors as the benchmark to derive ARs and CARs. AS Roma, Lazio Roma and BVB were identified as competitor group

Electronic Arts with respective competitor as the benchmark in the MRM

	T-test of EA's daily ARs			T-test of EA's CARs		
Event day	Activision Blizzard	Ubisoft	S&P 500	Activision Blizzard	Ubisoft	S&P 500
-1	0,53	0,54	0,63	0,53	0,54	0,63
0	-1,74*	-1,39	-1,80*	-0,86	-0,60	-0,83
1	-0,32	-0,24	-0,21	-0,88	-0,63	-0,80
2	-0,17	-0,26	-0,38	-0,85	-0,67	-0,88
3	-0,03	-1,13	-0,65	-0,77	-1,11	-1,08
4	0,28	-0,22	0,30	-0,59	-1,10	-0,87
5	-0,84	-1,54	-1,68*	-0,87	-1,60	-1,44
6	-0,69	-0,50	-0,51	-1,05	-1,67*	-1,53
7	-0,51	-2,11**	0,00	-1,16	-2,28**	-1,44
8	-1,17	-0,86	0,66	-1,47	-2,43**	-1,16

Table 8: This table shows the ARs and CARs of Electronic Arts, calculated with the MRM. The respective market index was replaced by using the competitors as the benchmark to derive ARs and CARs. Activision Blizzard and Ubisoft were identified as competitor group.

Herbalife with respective competitor as the benchmark in the MRM

Event day	T-test of Herbalife's daily ARs			T-test of Herbalife's CARs		
	Usana Health Science	Weight Watchers	S&P 500	Usana Health Science	Weight Watchers	S&P 500
-1	-0,49	-0,66	-0,57	-0,49	-0,66	-0,57
0	0,28	0,12	0,05	-0,15	-0,38	-0,36
1	-0,70	-0,93	-0,89	-0,53	-0,85	-0,81
2	0,18	0,24	0,15	-0,37	-0,61	-0,62
3	-0,18	-0,32	-0,16	-0,41	-0,69	-0,63
4	-0,89	-1,00	-0,92	-0,74	-1,04	-0,95
5	-0,83	-0,93	-0,92	-1,00	-1,32	-1,23
6	0,07	-0,03	-0,17	-0,91	-1,24	-1,21
7	-1,12	-1,18	-0,26	-1,23	-1,56	-1,23
8	1,28	1,00	1,72*	-0,76	-1,17	-0,62

Table 9: This table shows the ARs and CARs of Electronic Arts, calculated with the MRM. The respective market index was replaced by using the competitors as the benchmark to derive ARs and CARs. Usana Health Science and Weight Watchers were identified as competitor group.

Abnormal return and cumulative abnormal return - non-sport-related market environment

Company	Event day	MRM				CMRM			
		AR	T-Stat	CAR	T-Stat	AR	T-Stat	CAR	T-Stat
Altice	-1	-1,90%	-0,33	-1,90%	-0,33	-2,53%	-0,44	-43,99%	-0,44
	0	-2,07%	-0,36	-3,97%	-0,49	-1,26%	-0,22	-21,95%	-0,47
	1	2,81%	0,49	-1,16%	-0,12	1,99%	0,35	34,53%	-0,18
	2	1,02%	0,18	-0,15%	-0,01	1,65%	0,29	28,66%	-0,01
	3	3,90%	0,68	3,75%	0,29	2,63%	0,46	45,70%	0,19
	4	1,55%	0,27	5,30%	0,38	0,15%	0,03	2,56%	0,19
	5	-1,24%	-0,22	4,06%	0,27	-3,25%	-0,56	-56,35%	-0,04
	6	-2,46%	-0,43	1,60%	0,10	-1,75%	-0,30	-30,35%	-0,15
	7	7,78%	1,37	9,38%	0,55	4,63%	0,80	80,33%	0,13
	8	-3,24%	-0,57	6,14%	0,34	-5,19%	-0,90	-90,15%	-0,16

Table 10: This table shows the individual ARs and CARs of the non-sport-related market environment during the Cristiano Ronaldo rape allegation scandal.

Abnormal return and cumulative abnormal return - expired endorsement deals

		MRM				CMRM			
Company	Event day	AR	T-Stat	CAR	T-Stat	AR	T-Stat	CAR	T-Stat
Abbott Laboratories	-1	0,40%	0,49	0,40%	0,49	0,33%	0,28	0,33%	0,28
	0	0,58%	0,71	0,98%	0,84	0,90%	0,77	1,24%	0,74
	1	-0,44%	-0,54	0,54%	0,38	-0,55%	-0,47	0,69%	0,34
	2	-2,54%	-3,09***	-2,00%	-1,22	-2,53%	-2,15**	-1,84%	-0,78
	3	0,50%	0,61	-1,51%	-0,82	-0,44%	-0,37	-2,28%	-0,87
	4	0,19%	0,23	-1,32%	-0,65	-0,47%	-0,40	-2,75%	-0,96
	5	-0,22%	-0,27	-1,54%	-0,71	-0,33%	-0,28	-3,08%	-0,99
	6	-0,13%	-0,15	-1,66%	-0,72	-0,34%	-0,29	-3,42%	-1,03
	7	0,11%	0,14	-1,55%	-0,63	-3,46%	-2,94***	-6,88%	-1,95*
	8	1,34%	1,63	-0,21%	-0,08	-0,92%	-0,78	-7,79%	-2,10**
Konami	-1	1,08%	0,76	1,08%	0,76	2,61%	1,42	2,61%	1,42
	0	-0,29%	-0,20	0,79%	0,39	0,30%	0,16	2,91%	1,12
	1	0,49%	0,34	1,28%	0,52	0,41%	0,22	3,31%	1,04
	2	1,19%	0,83	2,48%	0,86	0,30%	0,16	3,61%	0,99
	3	-1,08%	-0,75	1,40%	0,44	-1,93%	-1,06	1,68%	0,41
	4	1,61%	1,13	3,01%	0,86	0,76%	0,41	2,43%	0,54
	5	0,00%	0,00	3,01%	0,79	0,00%	0,00	2,43%	0,50
	6	-0,75%	-0,53	2,25%	0,56	-2,30%	-1,26	0,13%	0,03
	7	1,10%	0,77	3,35%	0,78	1,11%	0,61	1,25%	0,23
	8	3,48%	2,43*	6,83%	1,51	-1,19%	-0,65	0,06%	0,01
Toyota	-1	0,19%	0,21	0,19%	0,21	1,22%	1,03	1,22%	1,03
	0	-0,91%	-1,01	-0,72%	-0,56	-0,52%	-0,44	0,70%	0,42
	1								
	2				Confounding Event				
	3								
	4	0,51%	0,57	-0,21%	-0,09	-0,07%	-0,06	0,64%	0,22
	5	0,00%	0,00	0,00%	0,00	0,00%	0,00	0,00%	0,00
	6	-2,07%	-2,29*	-2,28%	-0,95	-3,11%	-2,62*	-2,47%	-0,74
	7	-0,42%	-0,46	-2,69%	-1,05	-0,41%	-0,34	-2,88%	-0,81
	8	0,71%	0,78	-1,98%	-0,73	-2,43%	-2,05	-5,31%	-1,42
Samsung	-1	-1,07%	-0,99	-1,07%	-0,99	-2,21%	-1,28	-2,21%	-1,28
	0	-0,03%	-0,03	-1,10%	-0,73	-0,22%	-0,13	-2,43%	-0,99
	1	0,61%	0,57	-0,49%	-0,26	-1,40%	-0,82	-3,83%	-1,28
	2	0,00%	0,00	0,00%	0,00	0,00%	0,00	0,00%	-1,11
	3	0,48%	0,44	-0,01%	0,00	-2,19%	-1,27	-6,02%	-1,55
	4	0,28%	0,26	0,27%	0,11	0,00%	0,00	-6,03%	-1,42
	5	1,34%	1,24	1,61%	0,61	0,56%	0,32	-5,47%	-1,19
	6	-0,01%	-0,01	1,60%	0,56	0,00%	0,00	-5,47%	-1,12
	7								
	8				Confounding Event				

Table 11: This table shows the individual ARs and CARs of the expired endorsement deals during the Cristiano Ronaldo rape allegation scandal. For Toyota and Samsung the days were a confounding event was identified are eliminated from the table.

Abnormal return and cumulative abnormal return - parent companies

						CMRM			
Company	Event day	AR	T-Stat	CAR	T-Stat	AR	T-Stat	CAR	T-Stat
BP	-1	-0,16%	-0,18	-0,16%	-0,18	-0,77%	-0,62	-0,77%	-0,62
	0	1,18%	1,37	1,02%	0,84	0,93%	0,75	0,16%	0,09
	1	0,56%	0,65	1,59%	1,06	0,19%	0,16	0,35%	0,16
	2	-0,54%	-0,63	1,05%	0,61	0,06%	0,05	0,41%	0,17
	3	1,55%	1,80*	2,60%	1,34	-0,03%	-0,02	0,39%	0,14
	4	0,00%	0,00	2,60%	1,23	-1,73%	-1,40	-1,34%	-0,44
	5	-0,61%	-0,71	1,98%	0,87	-2,11%	-1,71*	-3,46%	-1,06
	6	0,26%	0,30	2,24%	0,92	0,32%	0,26	-3,14%	-0,90
	7	-0,15%	-0,18	2,09%	0,81	-1,78%	-1,45	-4,92%	-1,33
	8	-0,20%	-0,23	1,89%	0,69	-2,69%	-2,18**	-7,61%	-1,95*
Yum!Brands	-1	0,62%	0,65	0,62%	0,65	0,56%	0,49	0,56%	0,49
	0	-0,87%	-0,92	-0,26%	-0,14	-0,63%	-0,55	-0,06%	-0,04
	1	-0,49%	-0,52	-0,75%	-0,35	-0,58%	-0,50	-0,64%	-0,32
	2	-0,34%	-0,36	-1,09%	-0,47	-0,33%	-0,29	-0,97%	-0,42
	3	0,41%	0,43	-0,68%	-0,27	-0,30%	-0,26	-1,27%	-0,50
	4	0,89%	0,94	0,21%	0,08	0,39%	0,34	-0,88%	-0,31
	5	0,70%	0,74	0,91%	0,32	0,62%	0,54	-0,26%	-0,08
	6	0,67%	0,71	1,59%	0,53	0,51%	0,44	0,25%	0,08
	7	0,46%	0,48	2,04%	0,65	-2,26%	-1,98**	-2,01%	-0,59
	8	-0,76%	-0,80	1,28%	0,39	-2,48%	-2,17**	-4,48%	-1,24

Table 12: This table shows the individual ARs and CARs of the parent companies during the Cristiano Ronaldo rape allegation scandal

Ronaldo Neymar

Summary Output for same size of estimation and event window

Regression Statistics	
Multiple R	0,80
R Square	0,64
Adjusted R Square	0,62
Standard Error	10991
Observations	50

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	9857758527	3285919509	27,20042521	2,86418E-10
Residual	46	5556982887	120803975,8		
Total	49	15414741415			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	54231,83	3172,85	17,09	0,00	47845,21	60618,46	47845,21	60618,46
D Tr	34529,00	4487,09	7,70	0,00	25496,95	43561,05	25496,95	43561,05
D Post	50,55	4399,96	0,01	0,99	-8806,10	8907,20	-8806,10	8907,20
D TR * D Post	-18740,77	6222,48	-3,01	0,00	-31265,97	-6215,57	-31265,97	-6215,57

Average of absolute daily increase of Instagram followers	**Before**	**After**
Neymar	54232	54282
Ronaldo	88761	70071

Table 13: This table shows the regression statistics of the difference-in-difference analysis of Cristiano Ronaldo's Instagram Account in comparison to the Instagram Account of Neymar. D Tr * D Post is the coefficient displaying the difference-in-difference estimator, whereas D TR is indicating the Treatment Group and D Post the event time frame.

Ronaldo Messi

Summary Output for same size of estimation and event window

Regression Statistics	
Multiple R	0,83
R Square	0,69
Adjusted R Square	0,66
Standard Error	12059,27
Observations	50

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	14558493769	4852831256	33,36974911	1,31263E-11
Residual	46	6689598926	145426063,6		
Total	49	21248092695			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	59354,75	3481,21	17,05	0,00	52347,43	66362,07	52347,43	66362,07
D Tr	29406,08	4923,18	5,97	0,00	19496,24	39315,93	19496,24	39315,93
D Post	-17683,29	4827,57	-3,66	0,00	-27400,69	-7965,89	-27400,69	-7965,89
D TR * D Post	-1006,93	6827,22	-0,15	0,88	-14749,41	12735,55	-14749,41	12735,55

Average of absolut daily increase of Instagram followers	**Before**	**After**
Messi	59355	41671
Ronaldo	88761	70071

Table 14: This table shows the regression statistics of the difference-in-difference analysis of Cristiano Ronaldo's Instagram Account in comparison to the Instagram Account of Messi.

Ronaldo Neymar

Summary Output for estimation window start 1 January 2018

Regression Statistics	
Multiple R	0,22
R Square	0,05
Adjusted R Square	0,04
Standard Error	58300
Observations	548

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	90621726512	30207242171	8,887397793	9,2958E-06
Residual	544	1,84899E+12	3398884901		
Total	547	1,93962E+12			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	63429,73	3608,68	17,58	0,00	56341,08	70518,38	56341,08	70518,38
D Tr	25398,03	5103,44	4,98	0,00	15373,17	35422,89	15373,17	35422,89
D Post	-9147,34	16567,29	-0,55	0,58	-41691,05	23396,36	-41691,05	23396,36
D TR * D Post	-9609,80	23429,69	-0,41	0,68	-55633,55	36413,95	-55633,55	36413,95

Average of absolute daily increase of Instagram followers	**Before**	**After**
Neymar	63430	54282
Ronaldo	88828	70071

Table 15: This table shows the regression statistics of the difference-in-difference analysis of Cristiano Ronaldo's Instagram Account in comparison to the Instagram Account of Neymar. The starting point of the estimation is 1 January and the estimation window was, thus, increased.

Ronaldo Messi

Summary Output for estimation window start 1 January 2018

Regression Statistics	
Multiple R	0,370839378
R Square	0,137521845
Adjusted R Square	0,132765531
Standard Error	49204,56283
Observations	548

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	2,10007E+11	70002247705	28,91353751	2,33299E-17
Residual	544	1,31707E+12	2421089003		
Total	547	1,52708E+12			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	48784,77	3045,69	16,02	0,00	42802,02	54767,52	42802,02	54767,52
D Tr	39233,63	4307,25	9,11	0,00	30772,75	47694,51	30772,75	47694,51
D Post	-7113,31	13982,63	-0,51	0,61	-34579,86	20353,24	-34579,86	20353,24
D TR * D Post	-10834,47	19774,42	-0,55	0,58	-49678,04	28009,10	-49678,04	28009,10

Average of absolut daily increase of Instagram followers

	Before	After
Messi	48785	41671
Ronaldo	88018	70071

Table 16: This table shows the regression statistics of the difference-in-difference analysis of Cristiano Ronaldo's Instagram Account in comparison to the Instagram Account of Messi. The starting point of the estimation is 1 January and the estimation window was, thus, increased.

CARs outside of the event window - current sport-related market environment

		Before the event window					After the event window			
Company	Event day	AR	T-Stat	CAR	T-Stat	Event day	AR	T-Stat	CAR	T-Stat
Electronic Arts	-6	1,1%	0,70	1,1%	0,70	9	0,8%	0,49	0,8%	0,49
	-5	0,7%	0,42	1,8%	0,80	10	0,5%	0,35	1,3%	0,60
	-4	1,1%	0,69	2,8%	1,05	11	-1,1%	-0,67	0,3%	0,10
	-3	2,0%	1,29	4,9%	1,56	12	1,4%	0,87	1,6%	0,52
	-2	0,8%	0,52	5,7%	1,62	13	-1,0%	-0,63	0,6%	0,18
Herbalife	-6	-0,2%	-0,12	-0,2%	-0,12	9	0,2%	0,09	0,2%	0,09
	-5	0,3%	0,18	0,1%	0,05	10	0,9%	0,51	1,1%	0,43
	-4	-0,9%	-0,52	-0,8%	-0,26	11	0,9%	0,52	2,0%	0,65
	-3	0,4%	0,24	-0,4%	-0,11	12	0,9%	0,53	2,9%	0,83
	-2	-0,2%	-0,10	-0,5%	-0,14	13	-0,4%	-0,23	2,5%	0,63
Juventus Turin	-6	-0,1%	-0,03	-0,1%	-0,03	9	-4,3%	-1,52	-4,3%	-1,52
	-5	-3,0%	-1,07	-3,1%	-0,78	10	2,7%	0,96	-1,6%	-0,39
	-4	-2,6%	-0,92	-5,7%	-1,17	11	5,5%	1,93*	3,9%	0,79
	-3	0,7%	0,25	-5,0%	-0,89	12	-7,6%	-2,68	-3,7%	-0,65
	-2	-1,0%	-0,37	-6,1%	-0,96	13	0,8%	0,28	-2,9%	-0,46
Nike	-6	0,1%	0,07	0,1%	0,07	9	0,4%	0,30	0,4%	0,30
	-5	-1,3%	-1,00	-1,2%	-0,66	10	-0,8%	-0,61	-0,4%	-0,22
	-4	0,6%	0,44	-0,6%	-0,28	11	1,2%	0,88	0,7%	0,33
	-3	-1,1%	-0,86	-1,8%	-0,67	12	-1,4%	-1,07	-0,7%	-0,25
	-2	0,6%	0,45	-1,2%	-0,40	13	0,0%	0,03	-0,6%	-0,21

Table 17: This table shows the ARs and CARs of the sport-related market environment of the five days prior to the event and of the five days after the event window. Again the ARs and CARs were calculated with the MRM.