

**CAN SPORT IMPACT RATIONAL INVESTOR BEHAVIOUR?
AN EVALUATION OF THE IMPACT OF NATIONAL
SPORTING PERFORMANCE ON STOCK MARKET RETURNS
IN SOUTH AFRICA**

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ABSTRACT

The finance industry is an extremely fast and complex world dominated by the Efficient Markets Hypothesis (EMH). This theory contains many assumptions which include that investors are rational utility maximisers and that market prices reflect all relevant economic information available to the public. However, over the years, a new form of financial literature known as behavioural finance has been gaining momentum. Behavioural finance seeks to bridge the gap between psychology and economics in an attempt to gain a better understanding of how markets react to different situations. Behavioural finance has also gained much attention in recent years due to the EMH's inability to explain many economic anomalies.

This study first considers the differences between behavioural finance theory and EMH theory before explaining how an individual's mood has the ability to influence one's risk taking preferences. Mood changes were also found to be linked to changes in the way an individual reacts to different situations, the way they think and processes thoughts. Negative events were also found to have a greater influence on an individual's mood than positive events did, resulting in an asymmetric relationship between positive and negative results. This study then examines numerous studies indicating how non-economic events can have a statistical and significant influence on stock market returns before analysing previous literature where sport was found to influence market prices.

The aim of this study is to determine if South African national sporting performance can influence investors in such a way that it has the ability to impact on market returns. Using standard event study methodology, this study determines the constant mean return using the daily All-Share price index on the JSE for the period of 1 January 1990 to 31 December 2010. This study focuses on three of South Africa's most popular sports, namely soccer, cricket and rugby and examine if these three sports have the ability to influence market returns.

Although there is some evidence of a relationship between stock returns and sporting performance in the descriptive analysis, the regression results indicate that sporting performance in South Africa does not significantly explain abnormal market returns on the

JSE. The study provides a number of possible reasons for this finding and concludes by suggesting areas for future research.

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DECLARATION

This Masters thesis represents work that I (Carl de Beer) have done on my own with acknowledgements given to references wherever applicable. No part of this thesis has been or will be handed in or submitted to any other academic institution.

A handwritten signature in black ink, appearing to read 'Carl de Beer', written in a cursive style.

Carl de Beer

27 January 2012

“SPORT HAS THE POWER TO CHANGE THE WORLD.” – NELSON MANDELA

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Chapter 1: Introduction

1.1 CONTEXT OF THE RESEARCH

For many years, financial markets have considered asset prices as rational if prices properly reflect all available information relevant to their future economic prospects. This is known as the 'Efficient Market Hypothesis' (EMH) and forms part of the standard financial theory (Fama, 1991). Ritter (2002) argues that based on the EMH theory, investors compete in the market for abnormal profits, causing prices to shift until a new equilibrium is reached. However, it is becoming increasingly recognised that non-economic events such as sport can have a significant impact, not only on an economy, but on asset prices as well (Ashton *et al.*, 2003). Based on the EMH theory, sport should have no impact on stock market returns because it is considered to be a non-economic event. Thus, this study employs the behavioural finance literature as conceptual framework in an attempt to explain whether sporting performance has the ability to influence market returns in South Africa.

Behavioural finance draws on psychological literature that examines the impact of investors' mood fluctuations on the decision-making process. This field of research is a relatively new development in the finance literature that attempts to explain economic anomalies by importing ideas from psychology (Mishra and Smyth, 2010). This line of research is termed 'Neuroeconomics', which refers to the science of trying to understand how the brain works and then using this information to explain economic decision-making (Camerer and Loewenstein, 2005). Behavioural finance theorists argue that investors routinely and systematically allow their mood to influence their decision-making process, causing prices to deviate from the rational of an efficient market (Statman, 1999). Moreover, one main implication of behavioural finance is that events that are able to alter investors' moods, temper and confidence, will have a significant effect on asset prices (Boyle and Walter, 2007).

Saunders (1993) and Kamstra *et al.* (2000) were some of the first researchers to provide evidence that stock market returns could be influenced by economically neutral events that have no effect on the stocks themselves but instead impact on investor mood. Saunders (1993) examined the relationship between the New York weather conditions and the New York Stock Exchange and American Stock Exchange prices. The results showed that daily returns were negatively correlated with the cloud cover percentage of a specific day.

Thus, overcast mornings were associated with lower returns, while sunny mornings were associated with positive returns. Kamstra *et al.* (2000) investigated the impact of daylight savings on stock prices, and discovered that stock returns were significantly lower on days that follow spring and autumn time changes, which further confirmed that economically neutral events could affect the psychological state of investors, and, influence stock market returns.

Molin *et al.* (1996) documented that a condition termed Seasonal Affective Disorder (SAD) is directly linked to the number of daylight hours, with fewer hours of daylight contributing to increased depression. SAD was so significant that it was able to affect the global total market returns. Using this information, Dolvin *et al.* (2009) discovered that professional analysts who suffered from SAD, especially those in colder regions, were actually able to offset a general optimistic bias that existed in the market, which allowed for more accurate estimates.

Various studies have been conducted on the impact of World Cup tournaments and Olympic Games (termed mega-sporting events) on various economies in which they were hosted both before and after the events have taken place. It is therefore essential for this study to review the impact that 'sporting events' have on stock market returns before discussing how 'sporting performance' as a non-economic event, has the ability to influence stock market returns. Matheson and Baade (2004) investigated the impact of mega-sporting events on developing countries and found that the perceived benefits of hosting such events are often exaggerated and the true economic benefits are far less than predicted.

Floros (2010) focused more specifically on local investors and how their stocks in the Athens Stock Exchange were affected by the Olympic Games hosted in Greece in 2004, and found a positive correlation between local investor share prices and gold medals won by Greek athletes. Dick and Wang (2010) studied the economic impact of the Olympic Games on relevant local stock markets directly after the host city had been announced. They discovered that there was a significant and positive effect on the host cities' stock exchanges following the announcements.

Despite the extensive research that has been conducted in developed countries, little is still known about the impact that sporting events or results may have on a developing country's stock market and, as far as can be determined, no such studies have been done in South Africa.

Recently, several studies have been conducted regarding the impact of sporting results on local stock exchanges. According to Edmans *et al.* (2007), when selecting a given sporting

code, the chosen sport should encompass three main characteristics. Firstly, the chosen variable (sport) should affect the mood in a substantial manner, powerful enough to influence asset prices. Secondly, the variable must affect the mood of the majority of the population; hence, it is likely to affect enough investors. Therefore, domestic or provincial sides should not be selected. Thirdly, the effect must be correlated across the majority of individuals within a country.

Ashton *et al.* (2003) examined the impact of the English national football team's performance on the London Stock Exchange. Using event-study analysis, Ashton *et al.* (2003) were able to determine that the national football team's victorious performances were followed by good performance in market returns.

However, Boyle and Walter (2003) compared the New Zealand rugby team's performance and the New Zealand stock market returns and found no systematic link between sporting performance and returns on the stock market. Possible explanations provided for this finding were that investors were possibly more aware of their feelings when compared to other investors and that the majority of the investors were foreign and therefore not affected by local results.

Worthington (2007) analysed abnormal stock market returns during the annual Melbourne Cup held in Australia. The Melbourne Cup is held on the first Tuesday of every November and is one of the most highly anticipated sporting events on the Australian calendar. Taking into consideration *day-of-the-week* and *month-of-the-year* effects, Worthington's results showed that market returns during the Melbourne Cup are significantly greater when compared to returns of all other Tuesdays or any other day.

Edmans *et al.* (2007) conducted a comprehensive study of the impact of international football matches in 39 countries over a period of 30 years on local stock markets. The researchers found that investor behaviour was highly asymmetric and that losses resulted in much stronger negative stock market reactions than the corresponding results experienced after victories. Mishra and Smith (2010) analysed India's one-day cricket performance against any irregular movements on the Indian stock market. Their findings supported the findings of Edmans *et al.* (2007) concerning an asymmetric relationship between the wins and losses on stock returns.

1.2 GOALS OF THE RESEARCH

The main goals of this study are to identify if the national sporting performance in South Africa has the ability to influence investor mood in such a way that it results in abnormal market returns on the JSE. The ultimate goal of this study is to provide the JSE investors with explanations for abnormal returns following sporting competitions, thus, allowing investors to take advantage of movements in market prices. Hence, the primary goal of this study is:

- To determine the impact of national sporting performance on South African stock market returns.

1.3 METHODS OF THE STUDY

Following existing literature, this study employs event study methodology and focuses on the all-share index of the Johannesburg Securities Exchange. According to Edmans *et al.* (2007), the primary advantage of such an approach is that it identifies sudden changes in investor mood and its effect on the stock market returns.

This study will focus on the three major sporting codes within South Africa, namely soccer, cricket and rugby, which all satisfy the three characteristics required by any sport to be considered a variable, as set out by Edmans *et al.* (2007). It should be noted that the game of cricket consists of many different formats including 5-day test matches, one-day internationals and the latest introduction of the 20-over game. For this reason, this study will focus on one-day international cricket matches only.

The study will employ daily data on overall stock market returns from 1 January 1990 to 31 December 2010. This period was chosen because it coincides with the collapse of apartheid and the reinstatement of South African sport into the international arena. Results from the South African national soccer, cricket and rugby teams will then be collected in the correct date-order to allow stock market returns for the first trading day after each of the games to be identified properly.

The relationship between soccer, cricket and rugby performances and stock market returns will follow standard methods for assessing security market irregularities. Firstly, daily indices will be used to calculate the mean return. Secondly, using a standard t-test, the analysis will assess whether the return on the trading day following a particular match deviates from the mean return on all other trading days. Finally, an Ordinary Least Squares (OLS) regression model will be estimated to determine if a national team's victory or loss can explain part of the variation in the daily index.

1.4 ORGANISATION OF THE STUDY

This study is organised as follows: Chapter 2 reviews the theoretical arguments both for and against the EMH theory and behavioural finance. Chapter 2 is structured into two main sections: namely an overview and comparison of both EMH and behavioural finance, followed by psychological research explaining the relationship between individuals' moods and their decision-making ability. Chapter 3 examines how non-economic events such as different weather conditions are able to influence markets, followed by a psychological review on how sport can influence individuals' moods. Subsequently, the chapter reviews evidence on how mega sporting events influence economies and also discusses literature on sporting performance and its ability to influence market returns. Chapter 4 describes the data collected and the econometric methodology used within this study. Chapter 5 presents and discusses the results from this study. Chapter 6 concludes this study and provides some suggestions for further research.

Chapter 2: The Relationship between Economics and Psychology

2.1 INTRODUCTION

In order to form an understanding of behavioural finance, which is the underlying theory of this study, it is necessary to consider how mood is able to impact on an individual's behaviour. As such, this chapter is structured as follows: firstly, the theoretical foundations and literature within the field of behavioural finance are reviewed. Secondly, this chapter examines some previous studies that highlight the effects of induced mood changes on an individual and how these changes influence one's decision-making process. This chapter also discusses the arguments surrounding behavioural finance. The final section concludes the chapter.

2.2 THEORETICAL FOUNDATIONS

The growth of behavioural finance has gained considerable momentum over the past few years due to the inability of traditional economics to explain many economic anomalies that have had devastating effects over the years. According to Ritter (2002), the Efficient Markets Hypothesis (EMH) is the building block of modern finance. The EMH theory argues that when investors compete within the market for abnormal profits, this causes prices to shift to a new 'correct' value also known as equilibrium prices. The EMH assumes that markets are rational and that these markets can be used to make unbiased future forecasts.

Fama (1998) provides three reasons why market efficiency should not be written off as a viable working model. Firstly, the literature against market efficiency does not represent a random sample of events but highlights 'splashy' events that gain more attention; therefore, events create more of an incentive to find such anomalies. As a result, the searching, also known as 'dredging', for these anomalies is believed to be quite financially rewarding. Secondly, certain apparent anomalies may be generated by rational asset pricing and can be captured using models such as the multifactor asset pricing model. Finally, if under-reaction and over-reaction to new information is roughly evenly split within the market, this would still not support the theory for market efficiency. Thus, if long-term return anomalies are too large to be attributed to chance, they can support market inefficiency. However, Fama (1998)

found that when employing alternative approaches or methods and examining economic anomalies individually, most of them tend to be unstable and disappear in the long run.

In contrast to the EMH theory, the behavioural finance theory assumes that in certain instances, financial markets can be informationally inefficient. Ritter (2002: 1) describes behavioural finance as “research that drops the traditional assumptions of expected utility maximisation with rational investors in an efficient market.” According to Ritter (2002), there are large volumes of psychology literature that document how individuals often make systematic errors regarding investments. Such errors take the form of overconfidence and weighting recent events quite heavily. Individuals’ preferences can also create distortions. Ritter (2002) explains that instead of using an arrogant approach and ignoring such inconsistencies, behavioural finance uses these economic anomalies and combines them with perspectives from the psychology literature to create models that aim to replicate real world scenarios.

Ashraf *et al.* (2005) studied some of the work done by Adam Smith in an attempt to understand the workings behind behavioural finance. They focused mainly on Adam Smith’s first book, *The Theory of Moral Sentiments*, published in 1759, in which Smith argued that people’s behaviour is determined by a constant struggle between what he called ‘passions’ and the ‘impartial spectator’. These ‘passions’ to which Ashraf *et al.* (2005) refer include drives such as hunger and sex, and emotions such as fear and anger. According to Ashraf *et al.* (2005), Smith believed that behaviour was controlled by these passions which could only be ‘over-ridden’ if the individual viewed himself/herself from an outsider’s perspective, a method also known as the ‘impartial spectator’. Smith argued that in a social setting, the ‘impartial spectator’ would behave as a person’s conscience would and measures the conflicting needs of different individuals. However, he also recognised that this ‘impartial spectator’ had certain weaknesses and could veer off track or be rendered useless if the ‘passions’ were intense enough. Ashraf *et al.* (2005) goes on to highlight that Smith was one of the first researchers to document the asymmetric relationship between loss and gain. Smith emphasised the importance of negative events such as pain, since negative events are generally stronger and affect individuals in such a way that it outweighs any opposite feeling of pleasure.

Fama (1998) also conducted various studies over the years and believed that since the construction of the EMH, the developing literature challenged the assumptions underlying market efficiency (i.e. that market prices reflect all available information) and that their findings are unfounded. Fama (1998) argues that market efficiency should not be discarded

for two reasons. Firstly, in efficient markets, apparent under-reaction to information occurs at a similar rate and as often as over-reaction. Therefore, if one splits economic anomalies randomly between events that cause under-reaction and those that result in an over-reaction, markets would be consistent with market efficiency. Secondly, Fama (1998) believes that most of the long-term economic anomalies could be attributed to 'chance' and if they are so large that they could not be linked to chance; also, if one was to evenly split any apparent under-reaction and over-reaction, this would result in an overwhelming and convincing argument backing market efficiency. Thus, Fama (1998) further argues that all alternative theories contradicting market efficiency were too vague and simply referred to a substitute hypothesis as 'market inefficiency'. He believed this to be unacceptable and just as all other models suffered from various limitations, argued that market efficiency had its own limitations when describing price formation. However, in spite of its limitations, market efficiency should only be replaced by economic models that are more specific and better at describing price formation, whereby the model itself could possibly be rejected by other empirical tests.

In order to prove that market efficiency remains a dominant economic force, Fama (1998) considered behavioural models proposed and developed by the economists Barberis, Shleifer and Vishny (Barberis *et al.*, 1998). The BSV model uses information from studies on cognitive psychology and is based on two judgement biases: (1) Representative bias, where individuals rate highly the recent patterns in data and give little weight to properties that generate this data, and (2) Conservatism, which results in models being slowly updated once new information has been received. Fama (1998) believes that the BSV model efficiently explain the short-term anomalies for which they were designed, but their prediction power in the long-term is poor and unable to capture or explain the long-term results shown in the economic literature. Overall, Fama (1998) suggests that the long-term return literature seems to be much more consistent with market efficiency. Fama (1998) concludes his findings by suggesting that although recent finance literature has been able to produce many long-term economic anomalies, which when scrutinised, evidence indicates that market efficiency should not be neglected and that these anomalies are merely chance results.

Shiller (2003) disagreed with Fama (1998) and believed that Fama's findings were fundamentally flawed. According to Shiller (2003), there is no psychological principle that assumes that individuals will always over-react or under-react. Therefore, Fama's research regarding financial anomalies is incorrect in assuming that markets will either over-react or under-react. Fama's second criticism is also flawed in the sense that scholarly research by

nature continues to push the boundaries in all disciplines, thus challenging traditional knowledge. It is these initial discoveries that often get disproved and continue to challenge and develop our understanding of the world around us. Fama (1998) uses the example of excess volatility and believes that his study proves that this anomaly was nothing more than an apparent over-reaction in the short-run. However, Shiller (2003) argues that this anomaly has hardly been disproved and in fact is reinforced by evidence of stock market returns around the world.

On the other hand, Behavioural finance is made up of building blocks consisting of two parts (Ritter, 2002). The one being cognitive psychology (how people think) and the other building block consisting of limits to arbitrage (when markets will be efficient). It is valuable at this stage to explain what is meant by ‘cognitive psychology’ and ‘arbitrage’. Ritter’s (2002) study highlights many different behavioural patterns examined by cognitive psychologists, some of which include:

Heuristics: More commonly known as the ‘rule of thumb’, which assists individuals in the decision-making process. When individuals are under time constraints, heuristics enable individuals to make quick and relatively accurate decisions. Unfortunately, this method can lead to biases if anything in the individual’s environment ever changes.¹

Overconfidence: By nature, people are overconfident about their capabilities and the extent of their abilities. This can be seen in a number of examples, e.g. too little portfolio diversification. Researchers have also demonstrated that while both men and woman can be overconfident, men tend to be more overconfident than women.

Mental Accounting: Individuals often separate decisions which, in theory, should be combined. An example can be illustrated by a separate household budget for food and a separate budget for entertainment. Individuals tend to purchase less expensive food for their homes while ordering large expensive meals when eating at a restaurant. If they order the less expensive meal at the restaurant, buy the more expensive meal which they can prepare at home, they will ultimately save money.

Ritter (2002) further explains the limits of ‘arbitrage’ and how misvaluations of financial assets are common. He describes two kinds of misvaluations: a) those that keep

¹ Heuristics, according to Ritter (2002), is a process whereby individuals allocate investments evenly between available funds using the 1/N rule. Therefore, if there are three funds, an individual will invest one third of their total investment into each of these funds.

recurring and are arbitrageable, and b) those that seldom occur and are long-term in nature. Traders can use various trading strategies to reliably make money from recurring misvaluations. Misvaluations that are long-term in nature and occur infrequently make it impossible for investors trading in real time to accurately predict any of the peaks or troughs within the market until they have already passed. With this knowledge, Ritter (2002) questions the efficiency of markets. He answers this by dividing events into two categories, namely high frequency events that occur on a regular basis and low frequency events that rarely occur but cause damage to markets that take extended periods to recover. Ritter's (2002) findings illustrate that high frequency evidence supports the theory of market efficiency, although there is no single market strategy that can reliably and consistently provide profitable margins. On the other hand, market efficiency is not supported by low frequency evidence; examples of market inefficiency include the Japanese price bubble of the 1980s, the October 1987 stock price crash in the US also known as 'Black Monday', the Taiwanese stock price bubble of 1990 and finally the technology, media and telecom bubble of 1999-2000. In addition the minor depression experienced in 2007-2008 when the US land value price bubble popped is also another example of market inefficiency.

Shiller (2003) believes that financial literature has come a long way since the days when the EMH was considered a 'proven' hypothesis and believes behavioural finance to be the future of economic research. He writes about his own personal experiences and how during the 1970s he also believed the EMH to be the most powerful and accurate tool, and in its ability to explain how the financial world worked. However, he further states that "wishful thinking can dominate much of the work of a profession for a decade, but not indefinitely" (Shiller, 2003: 84). Shiller (2003) noted that stock markets exhibit more signs of market inefficiency than market efficiency. The author also acknowledged academic evidence suggesting that individual stock prices can at times resemble the EMH. However, this is a mere coincidence because the EMH theory represents everyone in the market as rational profit optimisers. This assumption is far from the truth because it assumes that all market participants are able to calculate complicated stochastic optimisation models and various other complicated models. Shiller (2003) argues that for these models to have any significance in the market, those with the knowledge and ability to calculate complicated economic forecasts have to offset the foolishness of the average trader. Ordinary investors often fall for speculative bubbles and Ponzi schemes, which makes such a theory impossible. Shiller (2003) further argues that the collaboration between the different sciences such as psychology, social sciences and financial literature has led to an ever-deepening

understanding of the world's financial markets. Future economists need to use this information and understanding of human flaws and incorporate them into more accurate future models.

2.3 THE EFFECT OF MOOD ON INDIVIDUAL DECISION-MAKING

Cognitive psychology forms one of the foundations of behavioural finance. Thus, according to behavioural finance, a person's mental state of mind is able to impact on economic outcomes. This study now turns to psychology research illustrating how a person's mood, whether natural or induced, can influence an individual's state of mind, therefore affecting an individual's decision-making process.

The effects of positive and negative state of mind have been well documented over the years. However, Taylor (1991) argues that relatively little research has been done comparing how both positive affect and negative affect may differ from one another. Further research conducted by Ashraf *et al.* (2005) focused on the asymmetric relationship between positive and negative affect first highlighted by Adam Smith in *The Wealth of Nations* first published in 1776. Taylor (1991) found that negative events evoke a much stronger response in individuals when compared to positive events. To gain a greater understanding of Taylor's findings, one should start with the definition of a negative event, which according to Taylor (1991: 67), "is one that has the potential or actual ability to create adverse outcomes for the individual". This definition evidently includes events that are yet to occur and are perceived as potentially dangerous, as well as events that have already occurred and could possibly be perceived as harmful. Walter Canon (1932) was the first person to describe the reaction to this response, which he termed 'fight or flight'. Canon (1932) argued that when any organism believes that it is under threat, the body reacts by mobilising both the sympathetic nervous system and the endocrine nervous system. As a result, this 'fight or flight' response leads to increased heart rate, raises an organism's blood pressure and increases both blood sugar levels and respiration rate. In summary, a negative event can be interpreted by the body as a threat, which may cause individuals to return to primal responses such as 'fight or flight' resulting in highly risk averse behaviour, (Taylor, 1991).

Taylor (1991) observes the different responses given by individuals regarding both positive and negative events. In all cases, Taylor found that these events affect individuals' patterns of thinking and processing as well as individuals' behaviour at different points. Taylor (1991) mentions that most of the earlier studies conducted on the impacts of

psychological stress involved the use of negative events that arouse fear. In the case of humans, these events led to anxiety, sadness and in some cases anger. Researchers did not use positive events as they believed that these events did not induce the same level of intensity as negative events due to the asymmetric relationship first documented by Smith in 1759.

Taylor (1991) also discovered diverse literature in psychology providing evidence that negative events do not only evoke different patterns of brain activity, but they also cause increased levels of physiological, affective, cognitive and behavioural activity. Taylor cites research that compared the number of stressful life events encountered by individuals over a certain period of time to the number of times an individual experiences illness and found a small degree of correlation between stress and illness. Such evidence supports the use of negative events as the preferred method of cognitive research when compared with neutral or positive events in individuals. According to Taylor's (1991) research, there are many lines of psychological research that concur with the above mentioned argument and believe that on the whole, negative events tend to have a much greater impact on individuals than positive events. Taylor's (1991) study considered a multitude of mood determinants ranging from test-taking to pregnancy. Using these results, it was discovered that the strongest determinants of an individual's mood were future expectations of negative events occurring. Furthermore, a negative mood has the ability to suppress any influence gained from expectations of future positive events. These negative future expectations would have an adverse effect on trading, as individuals become increasingly risk averse.

Another phenomenon involves how mood is able to influence the way in which individuals' process strategies change when making judgements. According to Taylor (1991), considerable research has been conducted on positive mood induced by individuals through focusing their attention on positive events. Positive mood was found to be linked to exceptionally quick and effortless information-processing strategies when compared to individuals in a neutral mood. When compared to those in a neutral mood, individuals who are in a positive state of mind tend to be more intuitive and use relatively simple solutions when solving complex problems. Individuals in a positive mood also make greater use of judgemental heuristics, use broader categories instead of narrow or specific categories when it comes to classification tasks and are able to make decisions faster and with less information. Taylor (1991) found the opposite occurs with individuals who are in a negative state of mind. These individuals tend to gather more diagnostic information, use more multifaceted processing techniques and tend to use fewer cognitive heuristics while at the

same time increasing logical expansion of complex messages. This could be detrimental to investors involved in financial markets trading.

Alloy *et al.* (1981) conducted a study involving a process whereby normally non-depressed college students were induced into a state of depressed mood and normally depressed college students were induced into an elated mood. The impact of these induced moods on students' susceptibility to the illusion of control was then assessed. Alloy *et al.* (1981) hypothesised that if current mood states were able to affect the accuracy in judging personal control, then naturally depressed students who were made elated would exhibit an illusion of control, whereas non-depressed students who were made depressed would judge personal control accurately. Alloy *et al.* (1981) determined that depressed students gave relatively more accurate judgements regarding the degree of control that they had over their responses and outcomes during an experiment. At the same time, students who were not depressed showed an 'illusion of control', which resulted in individuals overestimating the ability of their actions to impact on events which by definition were uncontrollable.

Other authors who believed negative events to be a good proxy for investigating the affects of mood was Johnson and Tversky (1983), who tested individuals' perceptions and affect induced by brief newspaper reports of tragic events. Their study revealed two biases: namely the primary bias and secondary bias. The primary bias refers to the common tendency for individuals to overestimate infrequent causes of death whereas they would under-estimate causes that are more frequent. The secondary bias refers to the observation that over-estimated causes of death tended to be those that were more dramatic and sensationalised when compared to other under-estimated causes of death. The under-estimated causes of death tended to be unspectacular events, such as those that may claim only a few or sometimes one victim at a time. Johnson and Tversky (1983) argue that one of the reasons for these biases, as suggested by Lichtenstein *et al.* (1978), was that these errors could reflect an availability bias induced by the media, which report events such as homicide or fires more frequently than suicides or drowning.

Both Johnson and Tversky (1983) and Alloy *et al.* (1991) used negative events in creating a better understanding of how individuals react in negative situations. Alloy *et al.* (1981) specifically selected the Velten technique² for the induction of salient mood states since this technique is better validated than any other mood induction procedure and has been used in a variety of clinical and social psychological experiments. This procedure is often

² Mood induction procedure whereby individuals read out aloud 60 self-referent statements that usually progress from elated mood to a negative mood (Gilet, 2008).

used to demonstrate the relationship witnessed between mood and other behaviours. The subjects were split into two groups, one group included the naturally depressed students and the other group included the naturally non-depressed students. These groups were split according to both their Beck Depression Inventory (BDI)³ and Multiple Affect Adjective Check List (MAACL) depression score.⁴ Subjects were tested individually by seating them in a room with a one way mirror so that the experimenter could observe the subject without the subject being able to see the experimenter. Once seated, the subjects were greeted by the experimenter and informed that they would have to complete 40 trials. Prior to performing the trials, subjects were given nine cards that included instructions for each subject to read before receiving the actual mood inducing cards that would follow. The 60 mood inducing cards provided by Alloy *et al.* (1981) were made up of 60 self-referent statements and, depending on whether or not the subject belonged to the depressed or non-depressed group, the statements would range from “God I feel great” to “I want to go to sleep and never wake up”, respectively. After reading these 60 cards and having either an elated mood or depressed mood induced in them, the subjects performed the trials. Subjects could respond in one of two ways; either by pressing a button in front of them, or by avoiding to press the button. This would result in one of two outcomes, either a green light would turn on or the green light would remain off. The subjects had no control over the green light that would turn on randomly in 50% of the 40 trials. Subjects were then asked to judge how much control their responses exert over turning the green light ‘on’.

One of the major findings from Alloy *et al.*'s (1981) study was that individuals' current mood states are able to influence their accuracy in judging the degree of control that they may or may not exert over certain events. The authors found that naturally depressed students, who were temporarily made elated, exhibited an illusion of control when judging their control on uncontrollable events associated with success. In contrast, naturally non-depressed students who were temporarily made to be depressed were able to accurately judge their personal control over the event. In addition, Alloy *et al.* (1981) found that naturally depressed students exposed to an absence of mood or neutral mood were able to accurately judge that as test subjects they had very little control over the event, whereas naturally non-depressed students exposed to the same testing exhibited an illusion of control. This finding concurs with Ritter (2002), where individuals by nature tend to be over-confident in their abilities.

³ BDI is a method used to measure relatively enduring mood (Bumberry *et al.* 1978; Hammen 1976).

⁴ MAACL is used to measure transient mood (Zuckerman and Lubin 1965).

By constructing brief accounts of tragic deaths, Johnson and Tversky (1983) investigated the role of affect and how it would influence an individual's judgement of risk. The aim was to simulate newspaper stories by describing details of the tragic events but giving no information about the prevalence. Johnson and Tversky (1983) then studied the effect of these stories on the perceived frequency of deaths caused by various risks, by comparing estimates made by two groups: one that had read the stories and one group that had not. They considered four possible outcomes after individuals were exposed to an affect-arousing story:

- 1) No increase in fatality estimates;
- 2) a local increase, limited to target risk;
- 3) a generalisation gradient (i.e. the more serious the event, the greater the increase in estimates);
- 4) a global increase. These four possible effects are not incompatible; both the local and global increases could be found in the same set of data.

Johnson and Tversky (1983) demonstrated that mood induced by brief newspaper reports were able to produce rather large increases in subjects' estimates when it came to predicting the frequency of risks and certain undesirable events. The authors also found that articles of happy events produced a positive effect that was equal and opposite to that of the negative reports, resulting in a global decrease in subjects' predictions for risk frequency. According to Johnson and Tversky (1983), these results give rise to the hypothesis suggesting that individuals tend to make judgements that are compatible with their current mood, even when the subject matter may be unrelated to the cause of the mood. Therefore, negative media has the ability to influence investors and their future outlook despite lack of economic relevance.

Mischel *et al.* (1976) investigated the influence of success and failure experiences and ex-experiences on an individual's selective memory, by focusing on the differences between the positive and negative state of the mind. This was done to determine an individual's positive versus negative personality information about oneself. First, the authors subjected all participants to a pre-experimental session whereby they performed personality tests and obtained information on the subject's personal assets and liabilities. Then the subjects were given a test to write and were split into three groups (success, failure and control). Subjects in the success experience condition were given feedback about their performance that was far above the average percentages. Those in the failure experience condition were informed that they had performed quite poorly in the test. Subjects in the control experience condition were shown how the test worked, but were not actually tested. Subjects were then given positive

and negative information to read and were led to believe that this information was feedback about their assets and liabilities from the information gathered during their pre-experimental session. Finally, the subjects were tested on their ability to remember the feedback using a recognition memory test. Mischel *et al.* (1976) assumed that it is widely known that memory for affectively potent information about oneself can be highly distorted. They also hypothesised that any new information contradicting individuals' expectancies generated from past success experiences will prevail, thereby creating new expectancies whose effects will be more prevalent in any individual's mind. In other words, new information is weighted more heavily than past experiences and will have a greater influence on an individual's investment decisions.

As predicted, Mischel *et al.* (1976) found that selective memory for affective information about oneself was significantly influenced by success or failure expectancies. Subjects were able to recall their personal assets relatively more easily than their liabilities when they expected to succeed than when they expected to fail. This effect of 'expected success' was due to a significant decrease in memory for liabilities in that condition. These results were congruent with earlier findings that after experiencing success, subjects would spend more time focusing on their personal assets than they did after failure or control tests. These findings also showed that individuals who 'glowed' with a positive expectancy seemed to process information regarding their personal liabilities less carefully and could remember it least well. In addition, Mischel *et al.* (1976) reported that individuals in a strong positive state of mind are more likely to engage in activities that might enhance their positive mood and avoid activities and behaviours that might affect it. These findings concur with research done by Dickhaut *et al.* (2003) where individuals were found to be risk averse despite being in a positive state of mind.

Following research examining the differences in positive versus negative state of mind, Crocker *et al.* (1988) found that consistent with cognitive theories, depressed and non-depressed individuals acknowledge events differently to one another. These differences in acknowledgement are due to differences in the way each individual perceives certain events that one experienced in the past. The authors believed that a simple preventative approach to depression might be to simply alter the way individuals diagnosed with depression perceive certain events. Crocker *et al.* (1988) found that differences in the way that depressed and non-depressed individuals perceive their social surroundings had been well documented in the past.

Crocker *et al.* (1988) therefore set out to address two specific objectives. Firstly, they examined the extent to which individuals' perceptions of both positive and negative events that occurred to others could explain the way an individual acknowledges certain events that one experiences personally. The second objective is concerned with how individuals' perceptions regarding the amount of times that both positive and negative events that others have encountered in the past is able to explain the frequency that depressed individuals believe these events will occur to them. Subjects participating in the study were asked to rate how often they believed positive, negative and neutral events happened to both themselves and the average college student. The results show that depressed and non-depressed subjects differ in the way they perceive both positive and negative events that they experienced in the past. In addition, non-depressed college students would rate themselves as having more attributes that are positive and less negative attributes than the average student. In contrast, depressed students in overall provided more equal unbiased comparisons, giving both themselves and the average student equal positive and negative attributes. In other words, non-depressed students believed that they were more likely to experience positive events than negative events relative to the average student, whereas depressed students did not show any biases towards themselves when compared to others. These findings confirm previous results, namely that depressed individuals are less susceptible to optimistic cognitive biases about themselves when compared to non-depressed individuals. Previous research conducted by Alloy *et al.* (1981) confirms the above findings that non-depressed students exhibited an illusion of control when compared to depressed students. Although depressed subjects believe that negative events happen to them on a more regular basis than non-depressed subjects, these depressed subjects also believe that negative events occur more regularly to other individuals than non-depressed subjects do.

Further research done by Dickhaut *et al.* (2003) focused on the differences between gains and losses and how these activate the different areas of the brain. Their study considered changes in individuals' brain patterns and behaviour by manipulating economic choices using two lotteries. The first lottery was considered risky while the second was certain. Thus, the outcome of winning or losing was fixed. Dickhaut *et al.* (2003) examined two crucial features regarding how individuals' thought processing works, the first being response time and the second focusing on brain activation. These were used to determine which factors in the human brain were responsible for the differences in behaviour regarding gains and losses.

Dickhaut *et al.* (2003) were able to demonstrate that although choice behaviour had been found to be relatively insensitive between the two different reference lotteries, response times and neural activation varied greatly between individuals. In other words, different neuro-physiological processes seem to control identical or similar choice behaviour. The results obtained by Dickhaut *et al.* (2003) regarding brain activation were gathered by brain scans using a Siemens ECAT 953B scanner and a tracer that would become radioactive when it was exposed to a highly active section of the brain and show up on the scanner. They discovered that regardless of the type of lottery, whether risky or certain, all subjects were risk averse when it came to gains. They also found that when loss was experienced, risk aversion almost completely vanished. Dickhaut *et al.* (2003) further report that reaction times and brain activation differ across these contexts and they also propose that there may be parallel processing systems in the brain that govern how lotteries are evaluated.

The remaining researchers focused their studies on the effects of positive state of mind and how these factors may influence an individual's memory, risk preferences and decision-making processes. Isen *et al.* (1978) proposed that individuals in a positive mood are more likely to retrieve positive material from memory than negative ones; hence, this affects the decision-making process with regards to behaviour. Therefore, any thoughts associated with or responsible for the positive mood or any mood inducing event may serve to cue positive material in an individual's memory. Isen *et al.* (1978) suggest that an affirmative mood in certain contexts helps facilitate the recall of positive material, thereby affecting an individual's estimates or expectations with regard to the behaviour under consideration, thus influencing their decision-making process regarding certain behaviours such as helping others. In other words, a person in a good mood may become trapped in a positive cognitive 'loop'. These findings are similar to the research conducted by Mischel *et al.* (1976) who found that individuals in a positive state of mind are more likely to engage in activities that enhance their constructive state. According to Isen *et al.* (1978), evidence suggests that people in a good mood tend to see the 'brighter side' of life and tend to respond more positively than others do to a variety of stimuli.

To determine how the positive state of mind influences individuals' decision-making processes, Isen *et al.* (1978) conducted two separate studies that investigated the effect of a positive mood on cognitive processes. The first test involved distributing small gifts to individual subjects walking in a shopping mall. One female posing as a representative from a company would hand out the gifts explaining that they were 'free' and meant to introduce the subject(s) to the company's product. Subjects in the control condition were not approached.

Another female on the other side of the isle would then approach these subjects with a 'consumer survey' questionnaire, oblivious whether the subject had received a free gift or not. The results showed that subjects whose positive state of mind had been induced after receiving a gift had increased constructive evaluations of the performance and service of various products they already owned. These results also indicate that in a field setting, as has been found in laboratory tests, subjects who have a reason to be in a good mood make more positive judgements than members who are in the control group.

The second study performed by Isen *et al.* (1978) involved subjects 'winning' or 'losing' a computer game in a laboratory setting. This study involved a male experimenter who would explain to subjects how to play a game called "Star Trek". Subjects had to control the star ship *Enterprise* and battle with a *Klingon Battle Cruiser*. The experimenter would then commence the game and advise the subject on the first move. However, the outcomes of the game were determined by the experimenter using a table of random numbers to determine 'successes' or 'failures'. At the end of each game, a message would appear on the screen saying either '*Congratulations*' or '*Enterprise Destroyed*', depending on the subject's victory or loss, respectively. The experimenter then asked subjects to listen to a 36 word tape and try to remember as many words as possible, before playing the computer game once more and either winning or losing that game. The subjects were subsequently asked to recall the words they had learned and were given five minutes to write down as many words as they could remember. Isen *et al.*'s (1978) results for this experiment showed that subjects who had won the game and received a positive outcome before they were asked to recall, were able to recall a significant amount of positive words when compared to subjects who received negative outcomes. The results from the second study can be interpreted to indicate that memory recall does seem to be affected by 'good mood' state of mind. However, the differences in recall did not appear to be related to victory or defeat at the time that the list of words was learnt. The differences only appeared between 'winning' and 'losing' subjects when they were asked to memorise and recall positive words. Therefore, the authors suggest that the differences can be attributed to increased accessibility to positive material when in a good mood. In summary, Isen *et al.* (1978) argue that within given limits, individuals in a good mood are more likely to think about positive events and memories. As a result of the cognitive loop, these positive thoughts and feelings will cause an increase in an individual's positive mood that is much greater than experienced at any another time. According to Mischel *et al.* (1976), this could be negative for investors as they tend to focus purely on positive market information, neglecting all other relevant economic information. Isen and

Patrick (1983) consider the influence that 'affect' may have on individuals' risk taking preferences. This study found that when a positive state of mind had been induced, this increased an individual's tendency towards taking risks. However, this was only the case when the chance of risk was relatively low; where risk was high, the results illustrated that individuals tended to decrease their levels of risk taking. Based on earlier research suggesting that individuals in a positive state of mind were more positive when it came to judging stimuli, Isen and Patrick (1983) assume that a positive state of mind could also result in increased levels of risk taking. According to Isen and Patrick (1983), this straightforward assumption was counter-indicated by data suggesting that individuals who are in a positive state of mind may be braver in certain situations, but they are also protective of their good mood and will try avoiding situations that may result in a loss of their positive state of mind. Thus, there are two contrasting theories: one where individuals in a positive state of mind are more likely to take risks, while the other theory states that individuals in a good mood may be more protective and cautious over their positive mood, thereby avoiding risk in certain situations.

In an attempt to understand individuals' risk taking preferences, Isen and Patrick (1983) conducted two studies simultaneously; one measured subjects' responses to certain hypothetical risk situations, while the second study looked at subjects' betting behaviour in a game of roulette. Volunteers from an introductory psychology class were given an unexpected McDonald's gift certificate to induce a positive state of mind. Isen and Patrick (1983) then set out their two studies in the following manner: In the first study, the experimenter informed subjects that they would be playing a game of roulette and each subject received ten poker chips. The subjects were then informed that each poker chip represented one credit and that they would be able to gamble with these credits however they saw fit. This was done so that the subjects would actually have to gamble or risk something that they valued, while at the same time not receiving any money as this could in itself function as affect manipulation. In the second study, high-risk, medium-risk and low-risk versions of two hypothetical situations were randomly handed out to subjects who were then required to read them.

Isen and Patrick's (1983) results for the first study supported the hypothesis that individuals in a positive state of mind would take greater risks, but only when the probability of loss was low. The results were consistent with previous studies, which showed that positive affect could increase an individual's willingness to help others if the performing of the helpful activity maintains the affective state. The results also confirm that individuals in a

positive state of mind have the tendency to be protective over their positive feeling state as discovered by Isen *et al.* (1978). For the second study, the results contrasted remarkably with the first. According to Isen and Patrick (1983), these results highlight the need to pay careful attention to differences in dependent measures of risk, especially when considering the study of risk taking. Isen and Patrick's (1983) findings showed individuals were less influenced by affect state in hypothetical risk taking situations than situations where tangible resources were being used. These findings showed that individuals in a positive state of mind, when compared with control subjects, were more daring and preferred high-risk options. The results from the second study showed that when positive affect had been induced in subjects and the risks were hypothetical, subjects became more willing to take risks on a 'long shot' when placing bets than control subjects. However, when the risk was real, as in the first study, subjects in a positive state of mind would not, "throw caution to the wind", and only bet higher than control subjects where the probability of risk was low and the chances of losing were slim. Isen and Patrick's (1983) results support previous literature on risk taking behaviour, but only where the level of risk has been clearly specified to participants.

Building on the work of Isen and Patrick (1983), Arkes *et al.* (1988) performed three experiments to determine how positive affect influences individuals' risk-taking behaviour. The pattern of findings discovered suggested that potential loss or the thought of potential loss might have an effect on risk preference. According to this literature, happy individuals only became more risk averse when significant loss became highly probable. However, when the probability of loss was low, individuals in a positive state of mind became substantially more 'risk prone'. Arkes *et al.* (1988) set out to investigate these above-mentioned factors by performing three separate studies.

Arkes *et al.* (1988) examined a subject's willingness to purchase lottery tickets, where the probability of winning and the amount that could be won were parametrically manipulated. In the first study they used hypothetical stakes; as a result, no real loss was possible. The authors expected positive affect subjects to show a higher rate of 'risk-prone' behaviour when compared with control subjects. Subjects were asked what they would pay for each lottery ticket. There were 25 lottery tickets, where the amount that could be won varied between \$10 and \$90, while the probability of winning those amounts varied between 10% and 90%. There were two methods of presentation used in the experiment: the one half of the group were presented with a sheet of paper on which all 25 lottery tickets used in the test were described and subjects were merely asked to fill in after each description the amount they would pay for that particular ticket. The other half of the group viewed a slide

show, each slide in the presentation gave a description for one ticket, and this information included the amount that could be won and the probability of winning that amount. These two groups were then randomly split in half. To induce a positive mood within subjects, the examiners then gave one half of each of these two groups a free gift of sweets. The sweets were wrapped in colourful paper with small cartoon characters and tied-up with a small piece of colourful string. This form of manipulation, according to Arkes *et al.* (1988), has been proven as a reliable way of inducing positive feelings within subjects and has been used by many researchers (e.g.: Isen *et al.*, 1978; Isen and Patrick, 1983) to induce a positive mood in individuals. The remaining subjects from each group were not given any sweets and would be used in the control condition.

The results for the first experiment were compatible with existing literature, showing that subjects in a positive state of mind tend to be more risk-prone when compared with subjects in a neutral state of mind. In the first experiment, the risk was hypothetical; therefore, subjects knew that no loss was possible and at no stage did the experimenter draw the subjects' attention to the probability or severity of the loss. However, as mentioned earlier, Isen and Patrick (1983) found contrasting results when individuals were in a positive state of mind while the gambling stakes were real. In this scenario, test subjects tended to gamble more when the probability of winning was high when compared to neutral control subjects and less likely to gamble when the probability of winning was low. Therefore, Arkes *et al.* (1988) note that according to this logic, individuals in a positive state of mind are more likely to be risk averse when compared with control subjects, but only when the probability of potential loss is so great that it threatens their positive state.

In the second experiment, Arkes *et al.* (1988) followed a similar procedure to that of the first experiment. Subjects were split into two groups that were then halved and one half of each group received a small gift of sweets to induce a positive mood. The only difference between the first and second experiment was that in the second experiment, the information now included the probability of the item being destroyed or stolen. Subjects were now asked how much they would pay for insurance to protect themselves against the possibility of loss. Arkes *et al.* (1988) found that subjects in a positive state of mind were willing to pay more for insurance and therefore protection against the possibility of loss than control subjects. This was especially true when the possibility for potential loss was high. As discovered by Mischel *et al.* (1976), individuals in a positive state of mind will engage in activities that protect their positive state.

In Arkes *et al.*'s (1988) final experiment, subjects were given instructions on how they should complete the following task: The experimenter gave some subjects small bags of sweets to induce a good mood. The subjects were then told that the small bags of sweets were gifts of appreciation to all those who participated in the experiment. These subjects were then asked to rate the similarity between eight pairs of items from an existing but unrelated experiment, which was followed by subjects reading a short story and then indicating what they would pay for the hamburger in the specific story. Following this, subjects were asked to rate eight neutral words on a scale of 1 (Good) to 6 (Bad). A manipulation check was then performed on the third experiment, which revealed that subjects in a good mood tended to rate the neutral words more positively, supporting the theory that the small bags of sweets were able to induce a good mood within subjects and affect individuals' decision-making process. However, as the results from Arkes *et al.* (1988) indicate, a subject's positive state of mind had little or no effect on the subject's willingness to pay higher prices for a hamburger than neutral affect subjects, regardless of the context. Even though a positive state of mind had been induced in subjects, this did not lead to an increase in the willingness of subjects to spend more money. The possible implication of this is that despite individuals being in a positive state of mind, it remains unlikely that they would be willing to pay higher prices for stocks.

Arkes *et al.* (1988) conclude their study by comparing their findings to previous studies and found that the results from all three experiments supported the growing body of literature that suggests that individuals' risk taking behaviour is substantially influenced by positive affect. They found that although inducing a positive state of mind may cause both risk-prone behaviour and risk averse behaviour and that these results may seem contradictory, the findings fit previous interpretations of the data rather well. Data collected from previous studies as well as the results obtained from all three experiments suggest that people in a good mood tend to be protective over their positive mood, especially when confronted with the possibility of loss. Therefore, Arkes *et al.* (1988) argue that one should not focus on how happiness can induce either risk-prone or risk averse behaviour, but instead on the role that affect has when it comes to increased avoidance of meaningful loss.

Finally, Moore and Chater (2003) wanted to determine the relationship between affective state and risk-taking behaviour. According to Moore and Chater (2003), globally, the average person is not accumulating enough wealth during his/her lifetime to support oneself after retirement. Although there are many factors that may cause this shortfall, the authors believe one of the major contributing factors is that individuals' portfolios are not

sufficiently risky. Moore and Chater (2003) argue that it is these low return and low risk investments (such as savings accounts) that underperform when compared to larger diversified portfolios containing more risk, resulting in greater returns that cause this problem. Thus, an understanding of what influences risky behaviour may assist researchers in understanding how to alleviate some of the current problems faced by economies surrounding current savings strategies.

Moore and Chater (2003) investigated how affective states were able to influence individuals' risk taking behaviour in the laboratory. Using simple gambling tasks, they were able to compare real world financial decision-making choices. Moore and Chater (2003) believed that although individuals' ability to recall events from the past was a useful tool, the world remains unpredictable and conditions are continuously changing, leaving individuals continuously exposed to surprising events that cannot be predicted by past events. Moore and Chater's (2003) findings show that in the case of negative affect, individuals seek to minimise exposure by selecting options that offer the least amount of uncertainty, thereby reducing their exposure to risk. Furthermore, they found that when individuals are in a positive state of mind, this tends to promote risky behaviour in an unknown rewarding environment. Therefore, Moore and Chater (2003) argue that affect may be closely related to risk-taking behaviour. Moreover, these cognitive findings show the important role that affect may play in helping understand certain economic behaviour for future research.

2.4 SUMMARY

This chapter has discussed the arguments surrounding behavioural finance. It can be deduced from the literature that although behavioural finance is still in its infancy, it is continuing to gain interest in the financial world. This chapter also considered various psychological studies, studying the effects of mood on individuals' decision-making processes. To gain a greater understanding of how mood can impact on individuals' risk preferences, both negative and positive states were examined. It was discovered that there exists an asymmetric relationship between positive and negative events and the latter has a much greater ability to influence individuals and the way they not only think, but also the way they make decisions and react to certain situations.

Chapter 3: Non-Economic Anomalies and their Impact on Markets

3.1 INTRODUCTION

Various researchers have conducted studies that attempt to identify a range of non-economic anomalies and how these may affect market prices. These include anomalies such as *day-of-the-week* or *month-of-the-year*, which hypothesise that on certain days of the week or months of the year prices will be higher or lower when compared to the norm. However, no anomaly has gained as much attention as the weather and its ability to influence investor mood and market prices as well.

This chapter reviews numerous studies based on non-economic events such as different weather conditions and stock market impacts. These include seasonal affective disorder (SAD), cloud cover, daylight savings anomaly and area-specific wind conditions. The ability of sporting events to influence market returns are also examined. Next, this chapter discusses studies investigating how sporting performance has the ability to affect an individual's mood. If non-economic events such as the weather are able to impact on an individual's mood and hence influence market prices, this chapter hypothesises that sporting performance is able to influence both investor mood and market prices. As such, this chapter also considers the literature on sporting performance as a non-economic anomaly and its ability to influence stock market prices. The final section concludes the chapter.

3.2 STOCK MARKETS AND NON-ECONOMIC EVENTS

3.2.1 WEATHER CONDITIONS

Many authors (e.g.: Boyle and Walter, 2003; Edmans *et al.*, 2007; Mishra and Smyth, 2010) regard the work by Saunders (1993) and Kamstra *et al.* (2000) as the foundation of economic literature focusing on non-economic events such as weather and its ability to affect stock markets. Both Saunders (1993) and Kamstra *et al.* (2000) were the first researchers able to provide evidence that non-economic events such as weather and disrupted sleep patterns resulting from daylight savings were able to influence market prices. These events had no economic effect on the stocks themselves, but were able to impact on investor mood.

Saunders (1993) examined the relationship between New York weather conditions and the New York Stock Exchange, based on a review of clinical and psychological experiments that had found weather to have a significant effect on an individual's behaviour. These clinical and psychological results explain the mood differences many individuals may experience on cloudy and overcast days when compared to sunny days. Saunders (1993) tested the null hypothesis that New York stock markets are not influenced by the New York weather conditions. If, according to Saunders (1993), it was discovered that security markets could be influenced by investor psychology, the null hypothesis would be rejected and one could argue for the inclusion of behavioural variables within asset pricing models. Furthermore, Saunders (1993) argued that rejection of the null hypothesis would mean that security markets, to a certain degree, were irrational. This would dispute the credibility of the conventional hypothesis that security markets only reflected economic information.

Saunders (1993) notes two advantages of using the New York Stock Exchange and the focus on New York weather conditions. Firstly, since all brokers assemble at the same place each day, a local mood variable can affect this particular group while at the same time excluding all other market participants. Secondly, by focusing on brokers in New York City, test results favour and are biased towards the rational markets hypothesis. Saunders (1993) argued that if the New York weather was able to influence the moods and in turn the decisions made by security traders, it could be assumed that it affects all other workers' moods in New York City. Saunders (1993) believed that by definition, no rational market should ever respond to such influences. Saunders uses the example of a news editor who cannot allow him/herself to be influenced by warm sunny weather on his/her way to work and only select good news for that day's publication, as such a biased publication would never be tolerated by a rational market. Finally, Saunders (1993) argues that local weather in New York City is used because observations are frequently made and are highly accurate within a limited geographical area, thereby providing a sufficient amount of data and allowing for meaningful testing.

Saunders (1993) discovered that the economic effects caused by changes in the New York weather were surprisingly significant and that these results supported existing literature arguing that stock prices do not reflect all economically pertinent news and information. Saunders found that the New York City weather had a historically long and significant correlation with major stock indices, which supports the theory that investor psychology is able to influence asset prices. Thus, Saunders (1993) argues that the empirical findings from

his study support previous research and argues for the inclusion of non-economic behavioural variables in asset pricing models.

3.2.2 SLEEP PATTERNS

Kamstra *et al.* (2000) investigated whether a non-economic variable such as a change in sleep patterns was able to influence financial markets and their stock returns. The authors' research illustrated that even the smallest changes in sleep patterns were able to cause errors in people's judgement, their ability to process information efficiently, loss of attention and anxiety. According to Kamstra *et al.* (2000), evolution has made sleep a crucial part of any individual's day. However, in recent times, it seems that people are fighting this necessity for sleep by continuously increasing the amount of weekly hours worked. Individuals working in the financial sector, dealing with large amounts of cash and other market instruments are most certainly represented by this small demographic who continue to reduce the average amount of time spent sleeping. To emphasise the importance of sleep, Kamstra *et al.* (2000) uses torture as an example: The need for humans to sleep is so important that it has been used as a form of torture for centuries by forcing individuals to remain awake until they become so delusional that they give in to their captors. Kamstra *et al.*'s (2000) study focuses on the daylight savings effect⁵ and its ability to disrupt sleep patterns.

Kamstra *et al.* (2000) found that whether an individual had gained or lost sleep, the effects were similar, and that daylight savings effects could be compared to the effects of jet lag. The authors state that "negative consequences are suffered whenever there is a desynchronosticity in circadian rhythm" (Kamstra *et al.*, 2000: 1006). In other words, if one travelled in a certain direction that stretched one's day, or if one travelled in the opposite direction that shortened one's day, both would result in desynchronosis and a disruption of sleep patterns. Kamstra *et al.* (2000) argue that these disruptions to sleep patterns, caused by daylight saving, may lead to anxiety. Therefore, investors suffer increased anxiety for a given situation and may prefer safer options in order to avoid risk. Even though investors know the date of daylight savings and when to change their clocks in advance, the outcomes of their decisions and the consequences thereof are not known, thus resulting in increased risk avoidance.

⁵ The Daylight Savings Effect is caused by the loss or gain of an hour on the first Sunday in April and the last Sunday in October every year (note these dates apply to the United States and Canada only). For more information on daylight savings and the different dates for various countries, see (Kamstra *et al.*, 2000).

Both Saunders (1993) and Kamstra *et al.* (2000) found evidence supporting the hypothesis that economically relevant information does not fully explain market reactions. Kamstra *et al.* (2000) found that a disruption in sleep patterns caused by daylight savings had a significant negative effect on stock returns and was able to influence market prices. Their findings were both statistically and economically relevant in the United States, Canada and United Kingdom stock markets. Therefore, Kamstra *et al.*'s (2000) results confirm that economically neutral events can affect the psychological state of investors and thus affect stock market returns.

3.2.3 SEASONAL AFFECTIVE DISORDER

Molin *et al.* (1996) focused their attention on non-economic variables with the ability to influence investors' psychological states and in turn the market. Seasonal affective disorder (SAD) is a syndrome that psychologists link to symptoms such as increased levels of sleep, increased hunger cravings and an increased demand for carbohydrates. SAD is usually characterised by a reoccurring depression that only appears during winter. The purpose of their study was to determine if there was any correlation between Beck Depression Inventory (BDI) and those individuals suffering from SAD during winter months. Molin *et al.* (1996) looked at numerous variables such as cloud cover versus sunlight, long days versus short days (known as 'photoperiod') as well as hot days versus cold days. Their study was able to determine that in accordance with existing literature, lack of daylight seemed to be the leading contributing factor towards winter depression. According to Molin *et al.*'s (1996) findings, the intensity and frequency of SAD symptoms were more profound in the northern latitudes where the temperatures and daylight hours during the winter months were more extreme. Molin *et al.* (1996) were able to deduce that variables such as cloud cover, the amount of rainfall and atmospheric pressure had no statistical significance when it came to patients' BDI scores. However, the authors discovered that the number of minutes that individuals were exposed to sunlight and warmer temperatures were the leading contributors influencing lower BDI regression scores.

Using the information from Molin *et al.* (1996), Dolvin *et al.* (2009) set out to determine if SAD could be used to explain certain discrepancies within financial markets. According to Dolvin *et al.* (2009), financial analysts play a vital role within any economy, as their forecasts regarding the future performance of an economy serves as one of the primary sources of information for investors. Dolvin *et al.* (2009) focused on financial analysts to determine whether their predictions could be affected by psychological disorders such as

SAD. In particular, their aim was to examine if the SAD effect could explain pessimistic biases found in financial markets. The authors discovered that existing literature (Molin *et al.*, 1996; Schwartz and Clore, 1983) documented SAD as a medical condition that resulted in depression and increased levels of risk aversion. Additionally, this condition was only found to be prevalent in the autumn and winter months of the year when daylight hours were at their lowest. Dolvin *et al.* (2009) researched that most studies believed the leading causes of biases in analysts' forecasts were attributed to either (1) analysts or financial managers guiding markets in a particular direction, or (2) psychological biases that are able to influence analysts and the way in which they process various decisions.

Dolvin *et al.* (2009) set out to determine if the SAD effect had any impact on analysts' earnings estimates. The authors hypothesised that any earnings estimates made during the 'SAD times' would be associated with lower earnings when compared to the rest of the year as a result of pessimistic biases. The findings by Dolvin *et al.* (2009) concur with those of previous authors (Kamstra *et al.*, 2000) who identify weather as a crucial anomaly able to influence stock market returns. Dolvin *et al.* (2009) report that the SAD effect was so significant with regard to market participants that it was able to affect total market returns. In addition, Dolvin *et al.* (2009) found that the SAD effect increased the analysts' levels of pessimism to such a degree during the SAD months that it affected estimated earnings by causing investors to be increasingly risk averse. This impact was particularly profound in the northern regions of the US and Canada where the reduced amount of sunlight encompassed higher levels of depression.

3.2.4 SANTA ANA WINDS

Based on the abundant finance literature regarding weather and its negative psychological as well as physical effects on humans, economists have begun investigating other distinctive weather conditions that may or may not affect stock markets. Saporoschenko (2011) set out to investigate whether the wind conditions in Santa Ana could explain variations in stock market returns in Southern California. According to the Saporoschenko (2011), Santa Ana's winds have been known to affect not only peoples' psychological and physical state, but also cause hypersensitivity. These winds are area-specific to Southern California and are characterised by hot and dry conditions with strong gusts of wind, and are often linked to a negative affect in a person's mood when they occur. Similar to Saunders (1993), who selected the local New York City weather and the New York Stock Exchange, Saporoschenko (2011) wanted to use a weather condition that was localised to the

geographical area in which the study takes place, hence the reason for selecting Santa Ana wind conditions.

According to Saporoschenko (2011), investors tend to purchase localised stocks rather than investing in other geographical areas. Therefore, the author focuses on localised Southern California based companies and their stocks where the Santa Ana winds are able to influence investors as mentioned above. Saporoschenko (2011) explains that investors tend to purchase localised stocks for a number of reasons. Firstly, there tends to be less information asymmetry. Secondly, local business journals tend to highlight annual reports of companies that are doing well in that particular region. Lastly, many companies offer employees stocks within the company through incentive schemes. Saporoschenko (2011) hypothesised that the stock returns of companies based in Southern California should be negatively influenced during days in which the Santa Ana winds are blowing. It is important to note that a crucial difference between previous studies and the work conducted by Saporoschenko (2011) is that his study examines results of stock returns on a firm-level basis and not index returns. This allows for the study of localised business stock returns and investors who may or may not be affected by Santa Ana winds.

Saporoschenko (2011) found no correlation between the Santa Ana wind conditions and stock returns on locally based Southern California companies. Although the Santa Ana wind conditions have a rich history of negatively influencing people's moods, Saporoschenko (2011) believes that the findings contribute to the growing amount of financial literature arguing that induced mood changes caused by weather are unable to influence stock returns.⁶

3.3 INDIVIDUALS' MOOD AND SPORT: PSYCHOLOGICAL EVALUATION

This section begins by discussing a psychological condition known as 'Basking in reflected glory' (BIRG). Cialdini *et al.* (1976) noted the informal support for individuals' tendency to associate themselves with a team's positive performance, while disassociating themselves from teams when they are performing unsatisfactory, had been well documented. However, their study aimed to bridge the gap within the informal support for BIRG by empirically investigating the BIRG phenomenon. Cialdini *et al.* (1976) note that successful individuals and teams can make others feel some kind of connection to their accomplishment. What seems more interesting is the need for individuals to publicly announce their connection with

⁶ For further information regarding empirical results that contradict the hypothesis that weather conditions are able to influence investor mood and therefore impact stock markets, see Trombley (1997), Zhu (2006), Gerlach (2007) and Jacobsen and Marquering (2008).

that given successful individual or team. What Cialdini *et al.* (1976) find most intriguing about the BIRG phenomenon is that individuals delight in the glory of a successful individual or team while they have in fact done nothing to contribute towards that success. The authors use the examples of states/provinces and cities who love to mention how famous sportsmen, politicians and supermodels were either born there, have lived there during some stage of their lives or continue to live within their boundaries. Other examples include individuals who enjoy recounting the days when they shared the same hotel, flight or bathroom with a famous celebrity. In order for Cialdini *et al.* (1976) to investigate the phenomenon of BIRG effects, the authors decided the most reliable information would be to focus on sporting codes.

Cialdini *et al.* (1976) performed three different experiments in an attempt to examine the BIRG effect of how individuals tend to bask in others' glory. The first experiment involved experimenters covertly monitoring the apparel of students registered for first year psychology courses in several universities. Their aim was to determine the frequency in which students wore apparel that clearly identified their university after a victory compared to after a loss. The authors argued that this would be a sensitive measure of how individuals wanted to declare publicly that they were linked to a particular university. These observations were conducted on Mondays after every weekend's game. The results showed that students displayed more university affiliated apparel following the recent success of their university football team as opposed to when the team lost. The authors attribute this to Heider's (1958)⁷ balance formulation, which states there are two kinds of perceived relationships: sentimental and unit relations. The first experiment's results are consistent with unit relations, whereby observers relate the positive result achieved by the team to the student wearing the university's apparel, and in order to maintain balance in their cognitive systems, observers will evaluate the student positively. However, the possibility exists that a victory experienced by the relevant team results in students liking their university more, thus displaying a tendency to wear more apparel that identifies the university to which they belong. This alternative theory was then tested in the next two experiments.

In the second experiment, Cialdini *et al.* (1976) investigated how spectators tend to use the phrase "we're number one" after a victory, as opposed to "they're number one". The emphasis of the pronoun 'we' is an example of the BIRG effect and allows individuals to publicly associate themselves with another person or team that is experiencing success.

⁷ For more information regarding Heider's balance formulation theory see, Heider (1958).

Experimenters called students over the phone and explained that they were from the 'Regional Survey Centre' and would like to ask them a series of questions. After completing the survey, experimenters informed students that they had either answered most of the answers correctly or not. These results were then followed by more questions about the university's performance in recent games. Cialdini *et al.* (1976) discovered that students used 'we' more often when trying to associate themselves with positive results. These results were even more pronounced when the students had performed dismally in the first set of questions and felt that their public prestige had been harmed.

The third and final experiment used a similar technique to that of the second, where experimenters phoned the students. This experiment set out to determine the usage pattern of the 'we/non-we' pronouns when students were asked to explain their university team's wins and losses. Cialdini *et al.* (1976) found that the term 'we' was most popular amongst students when describing victories. This term was used nearly twice as often as non-we pronouns when students were describing losses. According to Cialdini *et al.* (1976), their study strongly supported the theory of the BIRG effect. In all three of their experiments, there was a strong tendency for students to publicly associate themselves with a successful university team. The most noteworthy aspect of the BIRG phenomenon was that students would feel strongly affiliated to the success of the team, even though they did not contribute to the team's success. Therefore, Cialdini *et al.*'s (1976) study highlights the important role that sport plays within society and how individuals generally form strong bonds with their favourite sports stars or teams.

Wann *et al.* (1994) sought to compare the difference in emotional changes between supporters who had high levels of identification with their respective teams compared to those fans that had low levels of team identification. According to Wann *et al.* (1994), research has shown that results from sporting events have the ability to significantly influence individuals' mood states (e.g.: Schwarz *et al.*, 1987; Schweitzer *et al.*, 1992). However, these studies do not take into consideration the differences between high-identification fans and low-identification fans. Wann *et al.* (1994) hypothesise that high-identification fans are more likely to show significant increases in positive affects following a victory by their team when compared to low-identification fans, both before and after the games. High-identification fans will also experience significantly greater increases in negative affects following a defeat to their team. Low-identification fans, on the other hand, are expected to exhibit fewer emotional responses to such events because their teams' performance is less relevant to what constitutes their social identity.

Wann *et al.* (1994) conducted their experiment during the 1992-1993 American NCAA basketball seasons. Before one of their home games, subjects were asked to meet experimenters to complete two separate questionnaires. These included the Sports Spectator Identification Scale⁸ and a mood scale. Subjects were then escorted to the basketball arena where they could sit wherever they saw fit. They were asked to report during half-time and again at the end of the game to one of the experimenters. At the end of the game, subjects were required to complete the final post-game mood scale that was identical to the pre-game mood scale. In an attempt to simplify the measuring process, Wann *et al.* (1994) subtracted the subject's pre-game mood scores from their post-game mood scores, which allowed them to measure changes in subjects' mood. High positive numbers represented large increases in positive affect, while high negative numbers indicated large decreases in the subject's mood. As expected, the results support Wann *et al.*'s (1994) hypothesis that sports fans will exhibit increased positive mood changes following a win and negative mood changes following their team's loss. The extent of the increase in positive or negative mood changes is controlled by the subject's level of identification with that team. These results support the study conducted by Hirt *et al.* (1992), where high identification fans exhibited strong emotional reactions to different forms of media such as televised games. In addition, Wann *et al.* (1994) found that fans who had low-identification with their teams exhibited significantly lower changes in their mood when their team won or lost. Wann *et al.* (1994) also report that the level of identification played an important role in fans' affective states and the way in which they responded to post-game outcomes.

The effects of both negative and positive induced moods have been well documented in chapter two. Cialdini *et al.* (1976) investigated the phenomenon of BIRG and how individuals tend to publicly associate themselves with successful players or teams in the sporting world. Wann *et al.* (1994) determined that the stronger the fans' level of identification with ones favourite sporting team, the greater the impact a win or a loss will have on that individual's mood state. Hirt *et al.* (1992) wanted to examine what effect the outcome of a game would have on sporting fans' estimates about their own future. According to the authors, research has shown that a team's success or failure has the ability to influence a fan's mood. Therefore, Hirt *et al.* (1992) argue that these changes in mood and judgement caused by sporting results are able to influence individuals' moods in a similar way to personal success or failure. Thus, Hirt *et al.* (1992) further believe that if fans establish a high

⁸ For more information on the Sports Spectator Identification Scale, see Wann and Branscombe (1992).

identification connection with their team then the team's success, as with personal success, should result in a greater positive state. If the team loses and experiences failure, as with personal failure, this should result in a greater negative state. They also wanted to determine whether it was a change in mood that leads fans to anticipate their future success or failure differently, or whether this could be pinned on some other emotional state.

To determine these hypotheses, Hirt *et al.* (1992) designed two separate tests. The first test examined whether a team's performance had the ability to affect the way an individual viewed his or her own abilities in the future. The second test investigated whether changes in one's personal outlook on the future had been caused by changes in mood. In the first experiment, Hirt *et al.* (1992) recruited students from an introductory psychology class at Indiana University. These subjects were split into different groups consisting of win, loss and a control group. The subjects were asked to fill in a questionnaire to assess to what degree the subjects enjoyed basketball. Subjects assigned to the win group were then required to watch a recorded basketball game where Indiana University had won. Subjects assigned to the loss group watched a recorded game where Indiana University had lost. Finally, the control subjects watched a recorded game between two universities that were not familiar to the subjects' population. This was done so that subjects would remain neutral and their mood unchanged. After watching the respective games, subjects were requested to complete another questionnaire. This questionnaire required subjects to rate the two teams and their performances, individual performances, their current mood state, and finally predict how the Indiana University team would perform in the future.

Hirt *et al.*'s (1992) results for the first experiment were consistent with previous findings, suggesting that the performance of one's team has the ability to influence a subject's mood. Their findings showed that subjects' predictions regarding their own future performance, including the future performance of the team, were affected by the outcomes of the various recorded games. When subjects viewed a game in which their team had performed well, this caused subjects' future estimates of themselves and their abilities to improve, as well as improve their expectations of their team's future performances when compared to those subjects who had watched losing games. Subjects who were less interested in game outcomes showed fewer significant condition effects. Hirt *et al.* (1992) found that team performance did not lead to subjects performing the tasks better. Instead, it showed that subjects who viewed a winning game over-estimated their abilities to perform tasks, while those subjects who viewed losing games under-estimated their abilities. Therefore, differences in the results were mainly due to subjects' estimate biases.

In the second experiment, Hirt *et al.* (1992) wanted to clarify their understanding of the causes of a team's sporting performance to affect a subject's estimation of their team's future performance as well as their own. The authors also believed they needed a more sensitive test than the one proposed in the first experiment, and concurred that these results were not conclusive for the hypothesis of mood mediation. Therefore, they included self-esteem as an additional possible mediator. Hirt *et al.* (1992) argue that self-esteem has the ability to influence an individual's general mood. Additionally, personal success and failure have the ability to affect an individual's self-esteem. Hence, in the second experiment, Hirt *et al.* (1992) examined self-esteem as a possible mediator for estimates of teams' future performances as well as the individuals' own future performance. The procedure used in the second experiment was virtually identical to that of the first, with only a few minor changes. Subjects, after completing a questionnaire evaluating the players and the game itself, had to complete a questionnaire on their current mood state just as before. However, subjects were then required to complete another modified questionnaire from the Rosenberg (1965) self-esteem scale. The only difference in the modified scale was that subjects were asked to write about how they felt themselves at that particular moment, rather than reporting on how they felt in general. The results confirmed that team success worked in a similar manner to personal success when it came to increasing estimates of not only the teams, but also of one's personal performance. The opposite was found for team failure and personal failure, which led to decreased future estimates.

Hirt *et al.* (1992) were also able to determine that changes in a subject's level of self-esteem could influence future predictions about the team as well as personal performance. This contradicts the theory of mood as a mediator as first thought. Although both mood and self-esteem had been influenced by game outcomes, it was only self-esteem that proved to be a reliable mediator in influencing individuals' outlook in the second experiment. However, Hirt *et al.* (1992) acknowledge that there is considerable evidence that subjects use mood as a source of information when performing other tasks such as making judgements. Therefore, the authors conclude that mood should not be excluded as a possible mediator when it comes to influencing how individuals perceive their teams and personal future performance.

Write and Bower (1992) believed mood to be an important factor when it came to decision-making processes and aimed to determine if an individual's mood changes could affect the quality of an individual's probabilistic judgements. There's ample evidence supporting the idea that individuals use a memory retrieval system, whereby past long-term memories are used to make probability estimates for the future (e.g.: Isen *et al.*, 1978; Isen

and Patrick, 1983).⁹ As a result, people in a sad mood may recall more negative memories than positive memories, causing them to be more risk averse. As such, Write and Bower (1992) hypothesise that if mood has the ability to influence an individual's decision-making processes and probability judgements, this could result in poor decisions and distorted analyses that may have serious negative effects on the decision-makers themselves. According to Write and Bower (1992), such unintended mood disturbances could be particularly detrimental when performing risk assessment and financial analysis tasks.

Write and Bower (1992) summarise three general points regarding affect and cognition processes as developed by Bower and Cohen (1982).¹⁰ Firstly, feelings are similar to selective filters that relate aspects of a given situation currently being experienced to the individual's mood. Secondly, feelings have the ability to influence what information is retrieved from memory, known as the 'mood-context retrieval effect'. Finally, feelings influence different cognitive processes and affect how strategies are processed. This can influence how individuals arrive at certain social perceptions, the way in which they calculate risky decisions and how they make various judgements, as well as processing and quality of such conclusions. Therefore, Write and Bower (1992) expected that an individual's feelings could have a strong impact on the way they perceive certain situations, the way in which information is retrieved and the processing of that information.

In order to recreate these passionate mood changes in their subjects, Write and Bower (1992) used hypnosis, which was used to help subjects relax and allow them to focus more clearly on their judgements. The use of hypnosis allows subjects to become immersed in their stories and relive a happy or sad event. This allows different moods to be easily induced. Subjects were then asked to recall past events that made them happy or sad and then explain these situations to the experimenter. Subjects were asked to give accurate 'objective' probability estimates. They were then hypnotised into either a happy or sad mood by a professional hypnotist. When subjects were asked to describe what cognitive process had been used to calculate their probabilities, most subjects described the use of recent, vivid memories of particular events or personal experience to make a calculated judgement. The authors found a tendency for 'happy' subjects to overestimate the probability of positive events occurring while at the same time underestimating the probability of negative events

⁹ See Isen *et al.* (1978) and Isen and Patrick (1983) for more detailed information on memory retrieval.

¹⁰ See Bower and Cohen (1982:292-307) for more detail regarding the relationship between affect and different cognition processes.

occurring. The exact opposite was reported for 'sad' subjects, who overestimated negative events while underestimating positive events.

3.4 SPORTING EVENTS AND MARKET RETURNS

Mega sporting events such as World Cups and Olympic Games and their impact on economies around the world have been well documented throughout the years. Therefore, it is important to review the impact that 'sporting events' have on stock market returns before discussing how 'sporting performance', as a non-economic event, is able to influence stock market returns. The ability of these mega sporting events to influence markets and the general economy through the creation of jobs and tourism has led to increased demand for the hosting rights in many countries. Berman *et al.* (2000) argued that given the high demand and competitive rivalry between bidding nations to host the Olympic Games, a winning city might expect certain increased economic benefits flowing from such events. Berman *et al.* (2000) studied the expected economic benefits for the Australian stock market after it was announced on 23 September 1993 that Sydney would host the 2000 Olympic Games. Their findings showed no significant impact on the overall stock market index. Only a few industries showed a significant positive increase in stock prices, specifically those industries involved with infrastructure development.

Veraros *et al.* (2004) examined the Athens Stock Exchange (Greece) and the Milan stock market (Italy) reactions after the winning and losing host nations respectively had been announced for the 2004 Olympic Games. According to the authors, research has shown that mega sporting events have a significant positive effect on host economies. Veraros *et al.* (2004) therefore hypothesise that mega sporting events should have a positive effect on the stock market of the host country. Their findings revealed that the Athens stock exchange (ASE) had a significant positive reaction, while the losing nation, Italy, experienced no significant changes in stock prices. According to Veraros *et al.* (2004), these findings could be attributed to the size and geographical differences between the two host cities, *ceteris paribus*; therefore, the Olympic Games would have a much larger economical impact if assigned to Athens instead of Rome.

Floros (2010) performed a more in depth investigation of the relationship between the Athens stock market (ASE) and the Athens Olympic Games. The author examined the impact of the Olympic Games on the overall index of the ASE, stock prices of major Greek sponsors of the Olympic games, and finally, if Greek Olympic Champions could influence stock prices on the ASE, known as the 'winners effect'. Floros (2010) found no significant changes in the

overall ASE index but did report significant positive changes to stock prices of major Greek sponsors of the Olympics. Moreover, the results showed that Greek investors respond positively to Olympic success by their athletes, resulting in a positive effect on the ASE index as well as national sponsors whenever a Greek athlete won a certain event.

Dick and Wang (2010) investigated the differences between hosting the summer and winter Olympic Games and how these impacted local stock markets. They found that local stock markets reacted positively when host cities were announced for the summer games. Hosting the summer Olympics resulted in positive abnormal returns of approximately 2%, whereas Dick and Wang (2010) found no significant results for countries hosting winter Olympic Games. These results supported existing economic literature (e.g.: Berman *et al.*, 2000; Veraros *et al.*, 2004), suggesting that summer Olympic Games, because of its size, is more likely to have a significant economic impact when compared to winter Olympic Games.

Mirman and Sharma (2010) analysed the economic effects of winning or losing an Olympic bid for both the summer and winter Olympic Games. Their research period began with the 1996 Olympic Games announced in 1990, leading up to the 2012 Olympic Games announced in 2006. Mirman and Sharma (2010) compared both regular and abnormal returns for winning and losing countries and the differences between their respective market returns. While the authors found a small positive return when comparing winners and losers of summer Olympic Games, the opposite was found with winners of the winter Olympic Games, who showed significant negative stock market returns when compared to losers. This result indicated a strong negative reaction to the announcement of hosting the winter Olympic Games when compared to hosting the summer Olympic Games.

3.5 SPORTING PERFORMANCE AND MARKET RETURNS

This section examines existing literature in an attempt to determine if sporting performance can influence market returns. According to Ashton *et al.* (2003), in recent years, there has been an ever increasing interest in sport and its ability to influence the economy. However, until recently, most economic research involved sporting events and very little research had been done on the economic impact of sporting performance. One of the first studies to investigate sporting performance and its ability to affect market returns was that of Krueger and Kennedy (1990) who set out to examine the accuracy of the Super Bowl Stock Market Predictor (SB SMP) in the United States. According to the authors, few prediction schemes have had as much success and incredible accuracy as the SB SMP. This makes the SB SMP

an important sporting performance indicator when predicting market returns. The SB SMP has been successful as a prediction strategy and has been referred to in many college textbooks, it has also gained much interest from the financial world. Krueger and Kennedy (1990) pertain that if any team represented by the old 'National Football League' (NFL) wins the Super Bowl, this will cause stock markets to end the year higher than what they started. On the other hand, if a team represented by the old 'American Football League' (AFL) wins the Super Bowl, the stock markets will end the year lower than what they started. In order to test the accuracy of the SB SMP, Krueger and Kennedy (1990) selected five major stock market indices and monitored their performance from 1967-1988. The authors found that the SB SMP was able to predict the end of year sign (positive or negative) of annual market returns 20/22 times, with an accuracy rate of 91%.

Krueger and Kennedy (1990) then examined the ability of the SB SMP to forecast future price movements on the stock market using non-parametric testing. First, Krueger and Kennedy (1990) set up two identical portfolios consisting of \$1000 each to simulate the relative differences in performance between a buy-and-hold strategy and a SB SMP strategy. With regards to the buy-and-hold strategy, the authors assumed that the original \$1000 had been invested on 1 January 1967 into a mutual fund where returns mirrored that of Standard & Poor's 500 index. Returns on the investment were based on reports from the *Security Price Record* and dividends were always reinvested. With the SB SMP strategy, only one investment was made annually pending the outcome of the Super Bowl. If an NFL team won the Super Bowl, funds were transferred from the money market to the stock market mutual fund on the following Monday. If the funds had already been invested in the stock market from the previous year, then the funds were left alone. However, if the AFL won the Super Bowl, on the following Monday, funds were transferred from the stock market mutual fund into the money market. If the AFL had won the previous year, then the funds remained in the money market.

The results from this experiment showed that the mean gross return for the buy-and-hold strategy over this period had been 9.97%, while the SB SMP strategy had a mean gross return of roughly 15%. The results also indicated that even though the SB SMP strategy returns were much greater, they also had less variance and therefore entailed less risk than the buy-and-hold strategy of the S&P 500. Krueger and Kennedy's (1990) portfolio experiment revealed that when considering pre-tax portfolio values, the SB SMP strategy portfolio amounted to \$20 952, which was nearly three times greater than the buy-and-hold strategy, which only accumulated \$7 095. According to Krueger and Kennedy (1990), these findings

are inconsistent with the efficient market hypothesis since no theoretical relationship should exist between stock market movements and the Super Bowl. Therefore, if a non-economic event such as winning the Super Bowl can affect market returns, it can be argued that markets are inefficient, thus contradicting the Efficient Markets Hypothesis.

Using event-study analysis, Ashton *et al.* (2003) examined the possible relationship between the English national soccer team's performances and the London Stock Exchange. Ashton *et al.* (2003) argued that markets should react to sporting performance for two reasons. Firstly, if the national soccer team wins a match, this may result in a 'feel-good' factor, giving investors increased confidence in the future. Secondly, soccer has become increasingly more commercial in Europe. Thus, markets will estimate the potential economic benefits of their 'national' soccer team progressing in the tournament (i.e. FIFA World Cup or the Euro), based on individual match results. Ashton *et al.* (2003) hypothesise that important matches such as qualifiers or finals should result in greater and more significant movements in the share index when compared to friendly games. The authors collected daily data for the Financial Times Stock Exchange (FTSE) 100 index from 6 January 1984 to 3 July 2002, as well as all English national soccer team results starting from 6 January 1984 to 3 July 2002.

Firstly, Ashton *et al.* (2003) determined the mean return of the FTSE 100 index. Secondly, they tested for irregular movements in returns on trading days following matches. These results were then compared to the unconditional mean for all other trading days. Binomial testing was used because of its robust nature that makes it ideal for investigating stock market data that contains autocorrelated and heteroscedastic features. Finally, the authors use a Generalised Method of Moments (GMM) regression model to determine if winning or losing a national soccer game could explain variations in the FTSE 100 index. Ashton *et al.* (2003) found a statistically significant relationship between the English national soccer team's performance and changes in share prices on the London Stock Exchange. Results showed that a good performance (victory) from the national soccer team was followed by higher market returns. When the national soccer team performed badly (lost), this was followed by lower market returns. According to Ashton *et al.* (2003), their findings concur with a growing amount of economic literature indicating that the sporting industry has a substantial influence on the economy.

Boyle and Walter (2003) aimed to determine whether psychological and emotional responses to national sporting success or failure had the ability to influence investor behaviour. Their research was motivated by psychological studies indicating that non-

economic neutral events such as weather and daylight savings were related to changes in stock prices. Boyle and Walter (2003) argued that there existed no reason why sporting results should have any impact on stock market prices in a rational market; and, investors and market prices should remain unaffected by these events. However, as supported by psychological literature, if sporting event performance has the ability to influence investor self-esteem and in turn investor behaviour and beliefs, this may affect the investors' ability to identify profitable investments. When an investor's team wins, their confidence and outlook improves and investors become more willing to undertake risky investments, whereas a loss lowers investor confidence and reduces investment activity (Boyle and Walter, 2003).

Therefore, Boyle and Walter (2003) set out to investigate the relationship between the New Zealand rugby team performance and returns on the New Zealand stock market. The authors motivate their choice for the New Zealand rugby team, more commonly known as the *All Blacks*, by using an extract from a book written by Wilson (2000) who was part of the 1999 World Cup team. Wilson explains the reaction of the New Zealand supporters after having lost to France in the semi-final of the 1999 World Cup (Wilson, 2000: 187, in Boyle and Walter, 2003):

Few criminals convicted of the most heinous crimes, few politicians whose deeds have a daily impact on the lives of all New Zealanders, have been vilified as much as we were.

Boyle and Walter (2003) used monthly data from the New Zealand stock exchange beginning in January 1950 leading up to December 1999. The authors then collected all results and descriptions of each game the *All Blacks* had ever played. In this study, all opponents were treated equally and months were classified as positive if the *All Blacks* had won more games in that month than they had lost. The months were classified as negative if the *All Blacks* team had more losses than wins and neutral if no games were played during that month. Boyle and Walter (2003) were unable to establish any relationship between the *All Blacks'* performance and stock market returns, regardless of how the period or data had been manipulated. One possible explanation for this outcome might be due to the number of foreign investors trading on the New Zealand Stock Exchange, who are indifferent to the *All Blacks* performance. Another possible reason is that investors on the New Zealand Stock Exchange and *All Blacks* supporters may belong to mutually exclusive groups (Boyle and Walter, 2003).

An interesting study conducted by Worthington (2007) examined the exuberance of Australians during the Melbourne Cup (Australia's premier horse race) and what effect this might have on the Australian stock markets. The Melbourne Cup has been held on the first

Tuesday in November since 1861 and presently, it is considered by many to be the world's leading handicap horse race. According to Worthington (2007: 170), the Melbourne Cup is a national day in Australasia and its importance is difficult to describe:

It [the Melbourne Cup] overshadows all other holidays and specialised days of whatever sort in that congeries of colonies. Overshadows them? I might almost say it blots them out.

Worthington (2007) notes that while the Melbourne Cup is only considered to be a public holiday in Melbourne itself, the rest of the Australian nation comes to a halt as everybody abandons their normal activities in order to place bets and watch the races on television. Therefore, Worthington (2007) wondered if this excitement, anticipation and celebration associated with the Melbourne cup would relate to changes in stock prices and trading activity.

Worthington (2007) proposes a large body of literature suggesting that Australian stock markets suffer from *day-of-the-week* effect resulting in significant negative returns on Tuesdays of each week, also known as the 'Tuesday effect'.¹¹ According to a study conducted by Jaffe and Westerfield (1985), possible reasons for the 'Tuesday effect' in Australia could be as a result of the negative-Monday effect experienced in the US. Worthington (2007) also expected the average stock market returns to be positively influenced in the month of November because of the *month-of-the-year* effect. Thus, Worthington (2007) incorporated literature taking into consideration *day-of-the-week* and *month-of-the-year* effects. Worthington's hypothesis aims to test whether there is a positive influence on market returns during the Melbourne Cup held on the first Tuesday of every November. He tests this hypothesis by using two different approaches. Firstly, the author performs a descriptive analysis of the mean returns for all Tuesdays in the sample period and then tests the equality of means using parametric analysis. In the first approach, it is expected that mean returns for the Melbourne Cup Tuesdays will be positive and that all other Tuesdays will be negative. Tuesdays in the month of November are expected to be higher than Tuesdays in all other months, but returns are still expected to be negative when compared to the Tuesdays when the Melbourne Cup is held. Worthington's (2007) results for the first approach showed that when mean returns are compared, there is significant empirical evidence supporting the 'Melbourne Cup Tuesday' effect. He found that Melbourne Cup Tuesdays were associated with greater market returns when compared to all other Tuesdays

¹¹ The *day-of-the-week* effect refers to a situation where returns on some trading days are higher than others. For more information on the *day-of-the-week* effect and the 'Tuesday effect' in Australia, see (Jaffe and Westerfield, 1985).

or any other day of the week. The second approach is regression based. All daily returns in the sample period are regressed on variables such as the Melbourne Cup effect and other related effects such as day-of-the-week. The regression results revealed similar results to that of the first approach. Worthington (2007) believed that his findings were the first to provide non-impressionistic evidence linking abnormally high returns on the Australian stock market to the Melbourne Cup.

Edmans *et al.* (2007) noticed that a number of studies had linked changes in mood to variations in stock market prices. The authors further noted concerns that these results were a product of data mining, and called for further investigation into a new mood variable. Alternatively, Edmans *et al.* (2007) believed existing mood variables could be used on independent samples to support results achieved by previous studies. Edmans *et al.* (2007) discovered many psychological studies documenting the significance of winning and losing matches, and changes in fans' behaviour (e.g.: Hirt *et al.*, 1992; Wann *et al.*, 1994). Not only did sporting results have the ability to influence a fan's mood or self-esteem, but it had also been linked to increased heart attacks, escalating crime statistics as well as suicides following losses (Douglas *et al.*, 2002). However, authors such as (Taylor, 1991) have found no evidence of similar improvements to a fan's mood following a victory. Edmans *et al.* (2007) list two possible explanations for the existence of such asymmetric biases. Firstly, studies have shown that many supporters are subject to *allegiance biases* (e.g.: Wann *et al.*, 2001; Markman and Hirt, 2002). These individuals become psychologically invested with the team and certain desired outcomes that cause them to generate biased results and predictions in their mind. Secondly, asymmetric results may be caused by the asymmetric format of the competition itself: While a winning team might advance to the next round of a tournament, a losing team is eliminated from the tournament; thus the particular country will no longer be participate in the competition.

To test the ability of international soccer results and general sporting performances to influence stock market prices, Edmans *et al.* (2007) analyse a sample size of over 2,600 independent observations. These include 1,100 observations of international soccer matches, while the remaining 1,500 observations are split between rugby, cricket, ice hockey and basketball games.¹² All market returns were calculated in their local currencies, since the biases studied are associated with domestic investors and local returns. Edmans *et al.*'s (2007) results suggest that stock markets react negatively when national soccer teams lose

¹² For more information regarding the countries used in the various observations for different sporting codes, see Edmans *et al.* (2007).

matches. They found economically significant results of excess negative returns exceeding 7% when soccer teams lost. Statistically, significant results of excess negative returns when teams lost were also found for international rugby, cricket and basketball games. However, these results had a much smaller loss effect when compared to international soccer matches. In addition, the authors found no corresponding stock market reactions linked to positive results in any of the sporting codes.

Edmans *et al.* (2007) interpret their findings within the context of sporting performance and its impact on investor mood. They believe there are several reasons why this interpretation of the results is justifiable. Firstly, it has been demonstrated that sporting performance, in particular soccer results, have the ability to impact mood directly. Secondly, the negative effect has been found to be more pronounced in countries where soccer plays a particularly important role in people's lives. Finally, the authors found the negative effect to be particularly large in small stocks. Local investors predominantly hold these small stocks and evidence has shown them to be extremely sensitive to investor sentiment.

Extending the work by Edmans *et al.* (2007), Benkraiem *et al.* (2009) investigated how sporting performances of European listed soccer clubs¹³ could affect stock markets. Benkraiem *et al.* (2009) explained that unlike the normal industrial or commercial companies listed on local stock exchanges, listed soccer clubs do not publish quarterly financial statements that could affect share prices. Instead, share prices of listed European soccer clubs are determined by other sources of information, which includes how well a club performs. The authors selected soccer results as a variable, because out of all the professional sports played in Europe, no other sport gains as much attention as soccer. The media coverage of all matches surpasses any other sport, and the financial stakes involved with the game are enormous. Benkraiem *et al.* (2009) examined a study done by Renneboog and Vanbrabant (2002) that describes the ownership structure of listed soccer clubs as consisting mainly of principal shareholders and institutional investors, while the remaining shareholders are made up of individual investors, of which the majority are supporters of that club. Thus market prices for European listed soccer clubs depend not only on 'rational' economic investors but also on the 'emotional' supporters who have invested in the club.

According to Benkraiem *et al.* (2009), these structural differences explain why share prices react positively when listed clubs perform well and react negatively when listed clubs

¹³ Aalborg; Ajax Amsterdam FC; Birmingham City FC; Borussia Dortmund; Brøndby FC; Celtic FC; FC Copenhagen; Juventus FC; SS Lazio Roma; Millwall FC; FC Porto; SC Portugal; Preston North End FC; AS Roma; Sheffield United FC; Southampton FC; Tottenham Hotspur FC; Watford FC.

perform badly. This is mainly due to the differences in stock market behaviours. Traditional investors respond to economic rational factors, whereas supporters who invest in the club use 'affective' rationality to guide their decisions. In other words, supporters allow their emotions to guide their decisions. Benkraiem *et al.* (2009) expect market reactions to be asymmetric and that losses will result in greater variations in share prices than victories. This assumption is supported by Edmans *et al.* (2007) who believed that the 'allegiance bias' causes fans to believe that the 'norm' is for their team to win. Consequently, victories do not come as a shock, but if their team loses, this is seen as a major upset.

Benkraiem *et al.* (2009) used an event study methodology to examine how markets react to particular sporting events. Their research explored the dates surrounding the matches of all European listed soccer clubs. Particular focus was placed on examining trade volume and abnormal returns of share prices during this period. Benkraiem *et al.* (2009) found that markets had a significant reaction to sporting performance and that the match venue played an important role in the outcome. The authors found that when clubs won, investors responded positively, resulting in an increase in share prices. The authors also found that investors responded negatively when their clubs drew a game or lost, causing share prices to decrease. However, as predicted by Benkraiem *et al.* (2009), share prices significantly decreased by 1.9% when clubs lost a game, and also decreased significantly, by 0.273%, when clubs drew. However, despite the ability of victories to increase share prices, these increases were insignificant, confirming the existence of an asymmetric relationship between victories and losses. In addition, markets respond far greater to losses at home than to losses away from home: Home defeats caused share prices to decrease by 2.3%, while away games only resulted in a decrease of 1.68%. Benkraiem *et al.* (2009) also report that trading volume tends to increase one day prior to matches being played and in the days following matches, which supports the hypothesis that investors consider sporting performance when revising their portfolios around match dates.

Mishra and Smyth (2010) studied the impact of the Indian national cricket team's performance on Indian stock market returns. They also included a dummy variable that analyses the Indian national cricket teams' performance when highly rated cricketer Sachin Tendulkar is playing, to determine if there are any statistically significant changes to their results. The rationale for this dummy is based on Tendulkar's popularity as a cricket player in India and the important contribution he makes to the team. Although cricket traditionally consisted of one-day matches and five-day tests, recently, another form of cricket, known as Twenty-Twenty, has been introduced. Mishra and Smyth (2010) decided to only use one-day

international cricket matches because five-day test results can be ambiguous due to the length of the game and that Twenty-Twenty matches are a recent phenomenon in the international world of cricket; so, not enough data exists to warrant its inclusion. Mishra and Smyth (2010) pertain that while sporting events are considered non-economic events, one would expect stock prices to remain unaffected. They note that according to behavioural finance, large sporting events can influence viewers cum investors and their moods, which are translated into shifts in stock prices.

Mishra and Smyth (2010) hypothesise that supporters cum investors would feel optimistic about the future following a win by the Indian national cricket team; as a result, they purchase more shares than what they usually would. The opposite is expected when the Indian national cricket team loses a one-day cricket match, leaving supporters cum investors feeling pessimistic about their future prospects. The authors also believe that results may be asymmetrical based on previous research suggesting that supporters place a larger emphasis on losses, resulting in a much larger and significant downward movement in share prices when compared to share price increases following a victory. The first approach used standard event study methodology, where Mishra and Smyth (2010) gathered daily share prices for the main index in India known as the CNX Nifty, from 1995 to 2005. In the second experiment, Mishra and Smyth (2010) wanted to empirically test for stochastic dominance, using the DD test which was first proposed by Davidson and Duclos (2000).¹⁴ Mishra and Smyth's (2010) results for both approaches revealed that the Indian national cricket teams' performance had a statistically significant effect on the Indian stock market. These results supported the author's hypothesis and were found to be asymmetrical in nature. When the Indian national cricket team won, this resulted in a small positive impact on market prices, whereas a loss resulted in a large negative impact on market prices. Mishra and Smyth (2010) also found that the magnitude of the negative impact on market prices increased when the Indian national cricket team lost a match in which Tendulkar was part of the team; so, this further supports the theory that fans' emotions play an important role in investment decisions.

Gerlach (2011) analysed financial literature provided by Ashton *et al.* (2003) and Edmans *et al.* (2007) documenting how mood changes induced by sporting performances, in particular soccer, were able to influence market prices. Gerlach's (2011) study argued that although previous research had shown linkages between sporting performance and variations in stock prices in their home country, similar patterns in stock returns were documented in

¹⁴ For more information regarding the DD test and testing for stochastic dominance, see Davidson and Duclos (2000).

matching countries that did not play a match on that particular date. Considering that countries whose national teams did not play experienced similar patterns in stock price movements to countries who had played, Gerlach (2011) argues that changes in investor mood following losses could not be the cause of unusual stock returns in matching countries which were selected on the following procedures:

- Each country in the sample was matched with its largest neighbour, with whom it shares a border, using Gross Domestic Product (GDP) as a unit of measure. Island nations were matched with their largest closest neighbour.
- If countries that were matched played a match on the same day and experienced the same result, the study used the next largest bordering country.
- If data for the neighbouring country could not be located, then the next largest bordering country was used.

Directly contradicting Gerlach's (2011) assumption was Kaplanski and Levy (2010), who argue that international soccer matches have the ability to influence stock markets of countries whose teams are not playing. The authors believed that investors who became disappointed with their own national team's performance could decide to adjust their portfolios by changing their holdings in foreign stock markets. This would result in changes to market returns in those countries. Kaplanski and Levy's (2010) research showed that returns on the US stock markets were significantly lower during the FIFA World Cup. They believed that this could be attributed to a large cumulative effect, caused when numerous foreign investors, invested in US stock markets, suffer from disappointment caused by their national teams losing matches, thus resulting in mood changes.

Gerlach (2011) describes three reasons why the decrease in US stock markets has nothing to do with soccer matches played during the World Cup as described by Kaplanski and Levy (2010). Firstly, similar patterns of decreases in stock market prices exist up to four weeks before the World Cup even begins. Secondly, the European Soccer Championship, played every four years, has no impact on US stock markets. Since European investors hold more than half of all the equity on the US markets, in principle, they should also react to losses during the European Soccer Championship, causing US stock prices to decrease. Lastly, when the World Cup effect is measured over time, its effect on US stock markets weakens. According to Gerlach (2011), one should expect the World Cup effect on US stock markets to strengthen over time.

When analysing Edmans *et al.*'s (2007) results, Gerlach (2007) did away with the assumption that market related information for both winning and losing countries has the same impact in both countries following matches. Gerlach replaces the global index as a benchmark and instead, uses matching countries as a benchmark, thus controlling for regional differences in market performances. It also allows researchers to control for certain stock market anomalies such as day-of-the-week and holiday effects. Gerlach (2007) found that when comparing the loss effect for all World Cup games, trading days following matches had a positive mean return of +0.02% after a win, while a loss resulted in a negative mean return of -0.41%. This difference of 43 basis points was found to be statistically significant. However, matching countries' mean returns following a win were -0.02%, while mean returns after a loss were -0.35%, resulting in a difference of 33 basis points, which was significant at 5% level. With only six basis points separating a World Cup losing country and a matching country that played no matches, it becomes difficult to explain how the mood of one country affects its neighbours' stock markets.

In addition, Edmans *et al.* (2007) found that the performances of national soccer teams have a significant influence on smaller stocks when compared to large stocks. Gerlach (2011) found that when using the same World Cup teams, following a loss, large stocks decreased by -0.18% while smaller stocks decreased by -0.41%, resulting in a spread of 23 basis points. While these results support the findings of Edmans *et al.* (2007), when the same study was performed on matching countries, there was a difference spread of 32 basis points. This meant that smaller stocks performed worse in matching countries than they did in World Cup countries that lost. So, Gerlach (2011) believes that since the spread that exists between large and small stocks is prevalent in both markets, changes in investor mood cannot be blamed for the spread.

Finally, Edmans *et al.* (2007) found statistically significant results when comparing the performance of other sporting codes and their effect on local stock markets. Gerlach (2011) found that when comparing the same countries to results found in matching countries, rugby, cricket, ice hockey and basketball all lead to statistically significant negative returns after suffering a loss. However, these results were found in both the country that played the match and the matching country; hence, these changes in stock market prices cannot be interpreted as a result of changes in investor mood. Gerlach (2011) provides no alternative reasoning as to why matching countries and their markets mirror those of the actual countries playing the matches. He simply argues against the findings of Ashton *et al.* (2003) and

Edmans *et al.* (2007), which support the inclusion of psychological literature into economics and the ability of mood changes to affect investors' decisions.

3.6 SUMMARY

In this chapter, various economic anomalies have been analysed. This chapter started by considering weather as a non-economic anomaly and its ability to influence market returns. It was discovered that the New York weather and the amount of cloud cover could affect market returns as well as changes in sleep patterns and SAD. However, no such connection could be made between Santa Ana winds and variations in the California stock market returns.

This chapter also focused on sport and its ability to influence individuals' mood. Individuals tend to associate themselves with successful teams or individuals to improve their social status and that the greater a fan's identification with that team or individual, the greater impact a loss or win will have on that individual's mood state. Game results were also found to influence the way individuals view themselves and their future outlook and could also influence their decision-making abilities. This chapter then distinguished between sporting events and sporting performance, beginning with a short analysis of sporting events and their ability to affect market returns. While the hosting of the summer Olympic Games and FIFA World Cups proved to have statistically significant economic benefits, the economic impact of such events were mainly evident in stocks linked to the construction sector. Finally, this chapter investigated previous literature regarding sporting performance as a non-economic event and its ability to influence markets. These findings proved to be statistically significant for a variety of sports, especially soccer, in many different stock markets. Only results for the *All Black* rugby team in New Zealand proved to be insignificant. Overall the available evidence suggests the possibility that stock returns may be linked to national sporting performance.

Chapter 4: Data and Method

4.1 INTRODUCTION

Following from the previous chapter in describing past literature on sporting performance and market returns, this chapter provides a brief overview on the data and methodology used within this study. This chapter firstly describes the stock market data used followed by a breakdown of the various sporting codes analysed. Secondly, this chapter discusses the econometric methods employed. The final section concludes the chapter.

4.2 DATA

The stock market data used in this study originates from the Johannesburg Stock Exchange (JSE). The stock returns data comprise the daily All-Share Index closing prices, obtained from *Thompson's Datastream* for the period of 1 January 1990 to 31 December 2010. These dates were selected due to the lack of the availability of information available prior to 1992 regarding sporting matches. According to www.southafricaweb.co.za, South Africa had been banned from all international sport in the summer of 1964 due to the former apartheid regime policies. South Africa was readmitted into the international sporting arena in 1992. The All-Share Index is used to examine the effects of sporting performance on the market as a whole, as opposed to singling out main sponsors registered on the JSE. The choice of daily data is informed by the fact that international sporting contests have sporadic intervals. This is supported by previous research (Ashton *et al.*, 2003; Edmans *et al.*, 2007; Mishra and Smyth, 2010), which suggests that daily data is more accurate when performing event studies within the context of analysing the effects of sporting results on stock market returns. The JSE daily All-Share Index is presented in Figure 1, showing daily closing prices for all working days over a twenty year period starting on 1 January 1990 to 31 December 2010. Daily returns for the same period are then represented in Figure 2.

Figure 1: Daily All-Share Index, 1 January 1990 to 31 December 2010

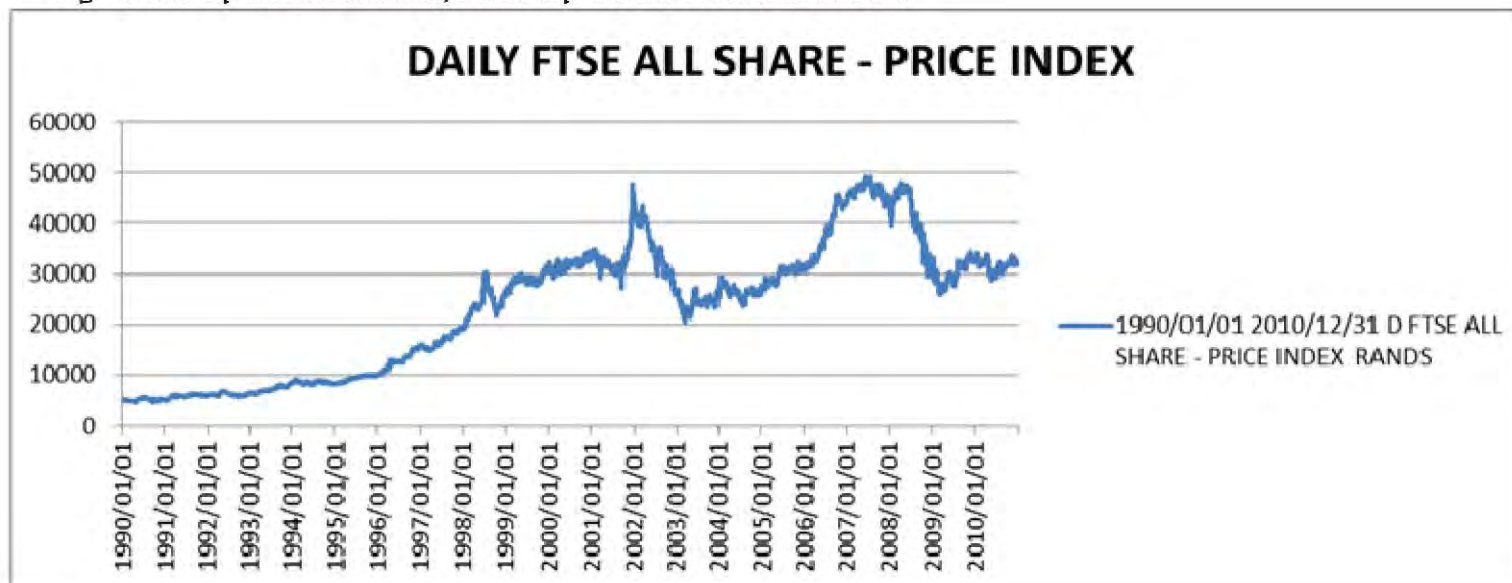
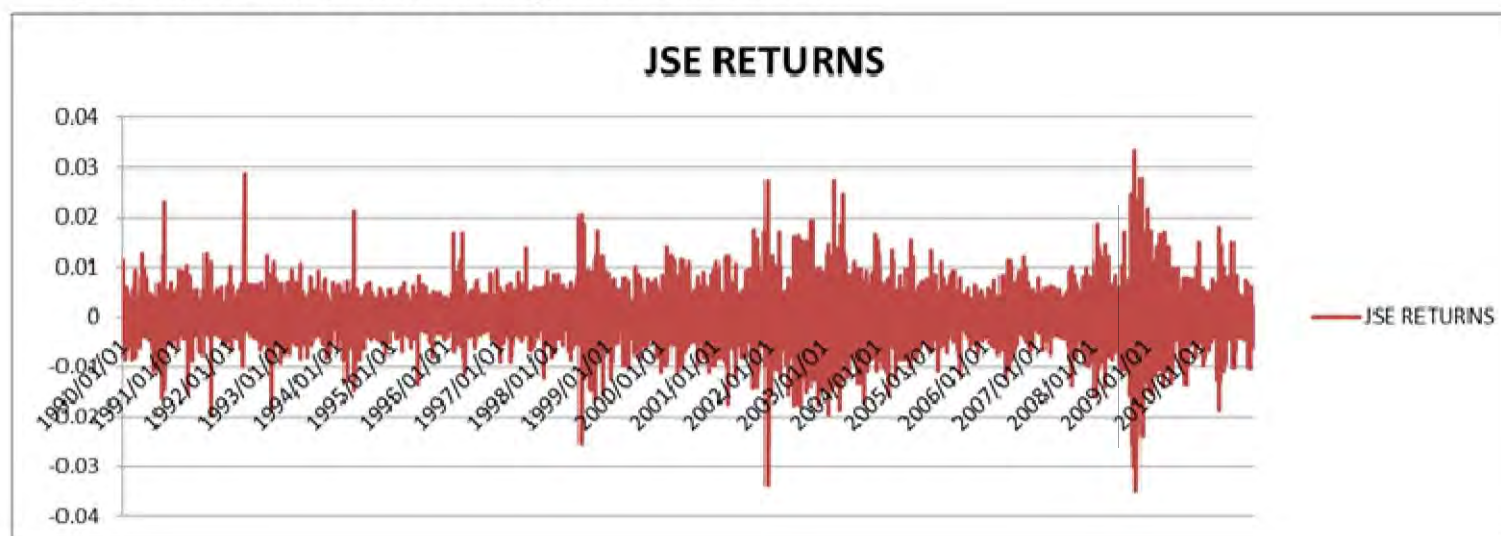


Figure 2: Returns on the JSE, 1 January 1990 to 31 December 2010



According to www.southafricaweb.co.za, the sporting industry in South Africa is a multi-billion rand industry. Income generated from sport represents over 2% of the country's annual GDP. In addition, www.safarinow.com believes South Africa to be a sports crazed nation, where sport is "...practically a religion..." The website goes on to describe how popular sport has become in the South African media and all newspapers and that "...there's no getting away from it!" According to www.southafricaweb.co.za, a recent 2004 survey identifying the most popular team sports in South Africa, found that 78% of the South African adult population expressed the most interest in soccer. This was followed by rugby with 47% and then cricket with 39% (participants in the survey could vote for more than one sport). For this reason, this study has selected the three most popular sports in South Africa, namely soccer, cricket, and rugby, to investigate the possibility that sporting performance could affect market returns on the JSE. The South African Travel and Tourism website (www.southafrica.info/about/sport/sportsa.htm) wrote that out of all the sports played in the country, South Africa has excelled the most at former British aristocratic games such as cricket and rugby and has performed at the highest level against the world's leading opposition for many years. However, the game of soccer has gained the greatest popularity amongst South Africans, especially among the black population.

According to the South African Travel and Tourism website (www.southafrica.info/about/sport/sportsa.htm), when South African teams are victorious, the united jubilation of millions of fans reverberates across the entire country, as supporters rejoice and celebrate their team's victory. However, the opposite can be said when South African national teams lose, leaving supporters temperamental, upset and mourning their team's demise. According to www.safarinow.com, South African fans are so competitive when it comes to rugby and the Springboks that a victory is considered a birth right. Pathak (2010)¹⁵ wrote after being in South Africa for just four days prior to the FIFA World Cup in 2010, that the South African fans were without any doubt "the most exuberant, passionate and noisy supporters I've ever come across." Thus, from the available evidence, it is clear that sporting performance emotionally influences South Africans in general. Hence, it is plausible to assume that South African sporting performance may affect investor mood.

As mentioned earlier, the most popular sport in South Africa is soccer. The national soccer team has been nicknamed *Bafana Bafana*, which means "The Boys". All results for *Bafana Bafana* were downloaded from the South African Football Association Official

¹⁵ Rahul Pathak is a journalist reporting for Aljazeera news.

website (www.safa.net), and a total of 249 sample matches were played between 7 July 1992 and 31 December 2010. This website updates all *Bafana Bafana* matches played and includes data on dates, scores, teams, venues and tournament details. According to www.safarinow.com, in 1991, soccer became the first sport in South Africa to be unified and captivated the hearts of millions of South Africans. Moreover, www.southafricaweb.co.za wrote that despite having the widest fan base and the largest number of South African supporters, the *Bafana Bafana* team had yet to achieve any major results from playing in international competitions. Their greatest achievement to date was when they won the African Cup of Nations in 1996 after failing to qualify for the previous cup.

The South African national rugby team is more commonly known as the *Springboks*. All results for *Springboks*' matches were downloaded from <http://www.gadgets.com/sarfu/text/archives.internat.htm>¹⁶. A total of 215 sample matches were played between 15 August 1992 and 31 Dec 2010. All information regarding international matches is regularly updated and recorded including the dates, venues, opposition and scores. The *Springboks*' greatest victory was when the *Springboks* won the 1995 Rugby World Cup. Since then, the *Springboks* have won the Tri-Nations¹⁷ three times in 1998, 2004 and 2009 as well as the 2007 Rugby World Cup.

Finally, this study explores the South African national cricket team. The national cricket team, known as the *Proteas*, was one of the first national sporting codes to accept the new protea emblem as their new national logo. All results for the Protea's one-day internationals were obtained from Cricket South Africa¹⁸. In total, 447 sample matches were played between 10 November 1991 and 31 December 2010. From these matches, 12 matches were excluded due to stoppage of play, caused by unfavourable weather conditions, leaving a sample size of 435 matches. The information included all dates, venues, scores, opposition and tournament details. As noted earlier, cricket traditionally consisted of only one-day internationals and 5-day test matches. Recently, a new form of the game was introduced, known as Twenty-Twenty. However, consistent with Mishra and Smyth (2010), the focus of this study will only be on one-day cricket matches. Due to the length of 5-day test matches, results can be ambiguous and Twenty-Twenty cricket matches have only been popular in the last few years (2007-2011); therefore there is not sufficient data to warrant its inclusion in

¹⁶ Thanks to Andrew Lourens, statistician at the South African Rugby Union (SARU) for providing the relevant data.

¹⁷ Tri-Nations is a contest between the three largest Southern Hemisphere Rugby Union nations, which include South Africa, Australia and New Zealand.

¹⁸ Thanks to Andrew Samson, statistician at Cricket South Africa, for providing the relevant data.

this study. The focus on only one-day internationals also allows results to be easily compared to previous findings (e.g.: Edmans *et al.*, 2007; Mishra and Smyth, 2010; Gerlach, 2011).

Based on the preceding discussion and the studies reviewed in chapter three, this study assumes that all three sports (soccer, cricket and rugby) satisfy the three key characteristics required for any sport to qualify as a mood variable (Edmans *et al.*, 2007):

- The selected sporting codes are able to influence mood in a considerable and unambiguous way.
- National squads are used to increase the impact of the mood variable on a significant majority of the population.
- The three sporting codes selected are correlated across a significant majority of individuals trading within South Africa.

The collective data for soccer, cricket and rugby are presented Table 1. This table includes the total number of matches played and split into the number of matches won, lost and drawn by all three sporting codes from the January 1990 to 31 December 2010.

Table 1: Summary of match outcomes according to sporting code

	Total Matches	% Won	% Lost	% Draw
Soccer	249	47% (n=118)	31% (n=77)	22% (n=54)
Cricket	435	64% (n=280)	34% (n=150)	12% (n=5)
Rugby	216	62% (n=134)	36% (n=80)	2% (n=4)

4.3 METHOD

This study applies event study and regression analysis to All-Share Index movements on the JSE following international matches played by the South African national soccer, cricket and rugby teams. Each sport will be examined separately in order to accurately isolate the results from each match played on the following day's stock returns. McWilliams and Siegel (1997) list three important assumptions that need to be taken into consideration when dealing with event studies. Firstly, event studies assume that markets are efficient, and that stock prices reflect all relevant information available to the public. Secondly, event studies deal with 'unanticipated events' and that the public prior to the event had no information about the outcome of the event. Abnormal returns are then calculated on the stock market's reaction to that information. Finally, it is assumed that the researcher has isolated the effect of an event from the effects of any other event. Therefore if results indicate that markets react to sporting

performances, one can conclude that markets are inefficient. Benkraiem *et al.* (2009) summarise an event study into three main steps:

- Firstly, the mean return should be calculated during the control period. In this study, the control period starts on 1 January 1990 and ends on 31 December 2010. It is, however, important to exclude sample dates following matches to avoid double counting of event information.
- Secondly, determine if there are any irregular movements on days following a particular event. This is done to test whether the actual returns differ significantly from the calculated mean returns. In this study, this will be done using a standard t-test.
- Finally, the statistical significance of the results needs to be determined, which requires the estimation of a regression model. Ashton *et al.* (2003) further explains that regression models are used to determine if the actual victory or loss of an international sporting contest is able to ‘explain’ any of the daily variations found in the All-Share index.

According to Seiler (2004), it is considered general knowledge amongst economists and investors alike that stock prices reflect all relevant information regarding a firm’s future. Therefore, any new information available on the market should have an impact on the price of the stock. Event study methodology is most commonly used to measure how stock prices react to new information. Seiler (2004) argues that firms use event studies to measure how their stock prices react to different information such as mergers and acquisitions. Firms also use event studies to measure how market-wide events such as changes to interest rates, accounting regulations, and macroeconomic data are able to influence their stock prices. Moreover, according to MacKinlay (1997), event studies are useful because of its ability to measure an event’s economic impact over a short period. This makes event studies ideal for determining the impact that any given sporting code may or may not have on stock market returns.

When performing the first step of an event study, there are certain necessary procedures that need to be followed (Bowman, 1983; McWilliams and Siegel, 1997; Seiler, 2004):

- Firstly, an event date should be defined, which is the date when market participants first learn about the new information. The more accurate the event date is the more powerful and accurate the results will be. In this study, the event dates are certain,

since the dates of all international matches are known. This increases the power of testing and increases the accuracy of the measurement and its impact on market returns.

- Secondly, an event window needs to be defined, which is the number of trading periods before and after the event. The main reasoning behind identifying an event window is to identify the phenomenon of *Leakage*. Leakage describes a process whereby event information is leaked out to the public before the release date and therefore, especially in the case of mergers for instance, one might expect stock market prices to slowly start changing prior to the event itself. This study deals with sporting results, so there is no need to identify an event window since nobody can predict the outcome of any international contest before the game is over; thus, it is not possible for leakage to occur in this case.
- Thirdly, an estimation period should be defined. The estimation period is usually defined as the period of time in which no ‘event’ occurs, which allows researchers to establish how stocks should behave when no event is present. However, when performing an event study examining sporting matches as a variable, the method used in identifying the estimation period varies slightly. This study has identified an estimation period starting on 1 January 1990 and ending on 31 December 2010. International matches occur sporadically during this period, so trading days directly after any match are then excluded from the estimation period to prevent ‘double counting’. This leaves an estimation period in which no ‘event’ has occurred, allowing for the mean to be determined without any interference from sporting matches.¹⁹
- Fourthly, one should select the sample of stocks to be used and determine necessary selection criteria. Stocks of interest should be identified or what stock exchange the study will focus on. According to MacKinlay (1997), the selection criteria may involve certain restrictions that are imposed by data availability, of the stocks required or the exchange on which it is traded. This study aims to examine whether South African national sporting performance has the ability to influence the market as a whole, and has selected the JSE daily All-Share index. This prevents the problem of

¹⁹ Note that these specific trading days are only excluded when determining the significance of abnormal returns over mean returns, with the full estimation period included in the regression analysis.

data mining or any result biases that may occur when selecting stocks associated with the given sport.

Finally, with all the above measures in place, one needs to calculate the normal returns. There are various possible methods for calculating normal returns, but the method used in this study is the Mean Return method which implicitly assumes that the mean return of stocks during the event is the same as the mean return during the estimation period. MacKinlay (1997) explains that the mean return method assumes that any given security remains constant through time. Therefore, the Abnormal Returns (ARs) are calculated as the difference between the actual return and the expected return. Although this approach is considered extremely simple to use, under certain conditions researchers (see, for instance: Bowman, 1983; McWilliams and Siegel, 1997; MacKinlay, 1997; Seiler 2004) have all found the mean return method to be quite accurate in determining normal returns.

Despite the statistically significant results experienced when using the mean return method, Dyckman (1984) labelled the mean return method as the 'naive' model because it does not take market-wide factors or risk into consideration. In spite of all of its success, Seiler (2004) argues that the mean return model suffers from two distinct problems. Firstly, when events occur too close together, this gives rise to 'event clustering'. Market-wide factors such as monetary policy changes or changes in accounting policies often give rise to event clustering when examining a firm's stocks. Therefore, in the event that international matches are played too close together, this could lead to event clustering. Secondly, problems occur when markets are trending up or down, also known as a bull or bear markets, respectively. This can lead to results being either upward biased or downward biased, depending on the market trend. In summary, the mean return method is sufficient for calculating expected returns despite its simplistic assumptions and has been used by many researchers (Ashton *et al.*, 2003; Boyle and Walter, 2003; Edmans *et al.*, 2007; Worthington, 2007; Mishra and Smyth, 2010).

After calculating the mean return, the second step when performing an event study is to calculate the significance of abnormal returns. This will be done using a standard t-test and f-test. The final step when performing an event study is to employ a regression analysis. Ashton *et al.* (2003) explains that regression models are used in determining whether a victory or loss by any of the three national sporting codes is able to 'explain' any of the daily variations in the All-Share index on the JSE. Mishra and Smyth (2010) describe the regression model as being a useful analytical tool in separating the effects of different events

on the stock exchange. Based on the work conducted by MacKinlay (1997) on event studies, the regression model used in this study will be estimated using Ordinary Least Squares (OLS) estimator. The regression model is specified as:

$$R_t = \alpha + \sum_k \beta_{1k} D_i + \varepsilon_t$$

Where R_t is equal to the return on day t , and D_i is a vector of dummy variables. This equation is estimated for each sport separately. In the case of soccer, the dummy is equal to 1 if the team won, and zero otherwise, while another dummy is included equalling 1 if the team lost, and zero otherwise. Hence, drawn matches are used as the comparison group. For both cricket and rugby, the dummy variable included equals 1 if the team won, and zero otherwise.

4.4 SUMMARY

This chapter provided a detailed description of the time-line used in this study, including the important role that apartheid played in this selection. This chapter then discussed reasons for selecting daily All-share stock indices on the JSE followed by detailed descriptions of all three sporting codes including soccer, cricket and rugby. Soccer was found to be the most relatively popular sport in South Africa despite its lack of performance over the years. This was then followed by rugby and finally cricket. Despite having only 47% support, rugby had the most international success, having won the Rugby World Cup twice since its reintroduction into international sport in 1992. Finally, this chapter discussed the methodology employed in this study, consisting of both descriptive and regression based analyses.

Chapter 5: Results

5.1 INTRODUCTION

The principal aim of this chapter is to determine whether soccer, cricket and rugby performances can explain abnormal shifts in South African stock market returns. This chapter first discusses the calculation of the various mean returns, after which the mean returns and abnormal returns are compared to determine if they are significantly different using basic descriptive analysis. This chapter estimates several OLS regressions to determine if sporting performances can explain shifts in stock market returns on the JSE. The final section concludes the chapter.

5.2 CALCULATING THE MEAN RETURNS

The standard event study analysis requires that the constant mean returns be calculated first using daily all-share index prices. To calculate the mean return for each individual sport, all returns for days following matches were excluded from the calculation to avoid double counting. If, however, a match was played on a Friday, Saturday or Sunday then the following Monday's returns would be excluded. If more than one game was played between Friday and Sunday, only the latest game would be counted and again the Monday's returns following the weekend's matches would be excluded. Because all soccer, cricket and rugby matches were played on different days, the mean returns for each sport had to be calculated separately. The results of those calculations are shown in Figures 3 to 5:

Figure 3: Mean Returns for Soccer, 1 January 1990 to 31 December 2010

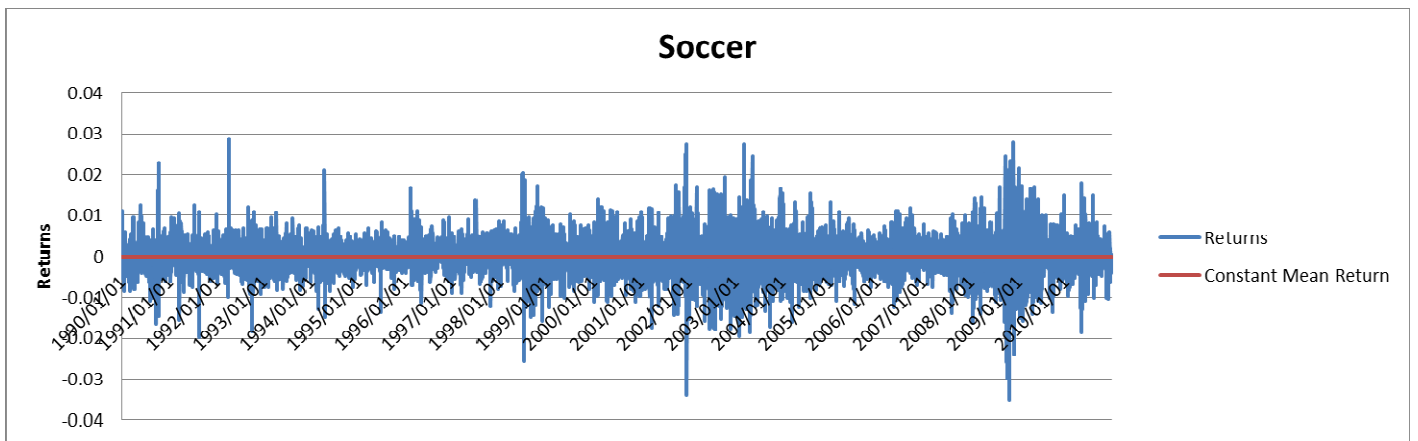


Figure 4: Mean Returns for Cricket, 1 January 1990 to 31 December 2010

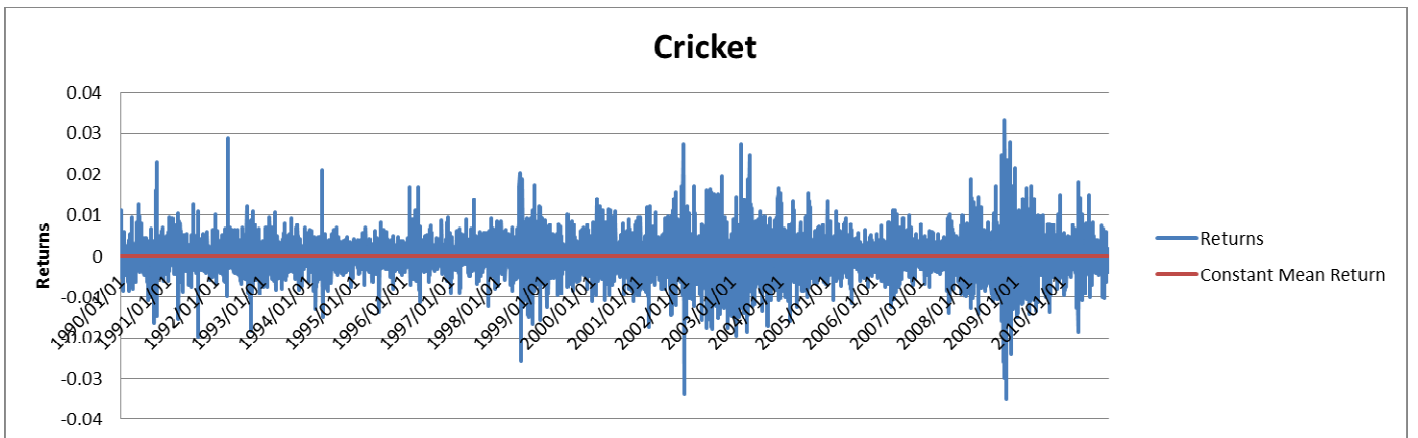
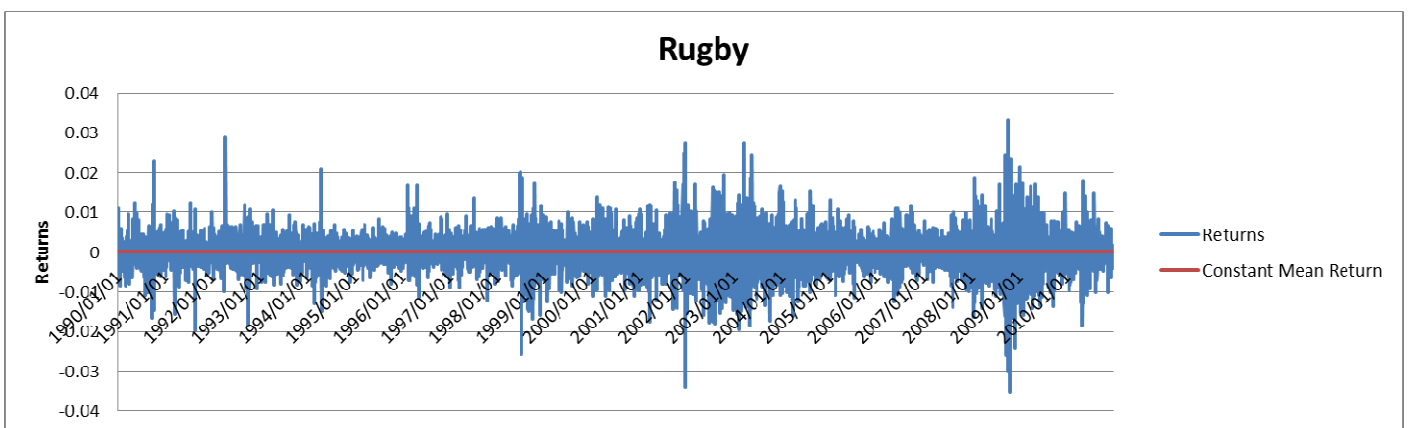


Figure 5: Mean Returns for Rugby, 1 January 1990 to 31 December 2010



The constant mean return for soccer equalled 0.000128, while for cricket it was 0.000152. The constant mean return for rugby is 0.000144. The following section considers whether, for each sporting code, the abnormal returns differ significantly from the constant mean returns.

5.3 THE SIGNIFICANCE OF ABNORMAL RETURNS

To determine whether returns on trading days following national sporting matches are significantly different from the constant mean return, this study uses standard bivariate tests. In each case, the null hypothesis assumes that there will be no significant difference between the constant mean return and daily returns following sporting performances. The results are presented in Table 2.

The results indicate that abnormal returns on trading days following matches are significantly different from the constant mean returns of all three sporting codes. Therefore, the null hypothesis is rejected and it can be concluded that there is a significant difference between the constant mean returns and abnormal daily returns experienced on trading days following sporting performances. All test statistics have p-values of 0.000; thus, all the results are highly significant at a 1% level. With abnormal returns proving to be statistically significant at a 1% level, the final step of an event study can be performed by estimating OLS regression models. However, before running a regression analysis, it is important to determine whether the stock returns series is stationary. This is done using a Dickey-Fuller GLS (DF-GLS) unit root test. These results can be seen in Table 3. The DF-GLS results strongly indicate that the daily stock return series is stationary in level terms, thereby validating the use of the standard return series as the dependent variable in the OLS regressions.

Table 3: DF-GLS unit root test of stock return series

		<i>t</i> -statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-12.56433
Test Critical Values	1% Level	-2.565265
	5% Level	-1.940866
	10% Level	-1.616672

Table 2: Summary of standard t-test, F-test, Mann-Whitney U test and Constant mean returns for soccer, cricket and rugby

Sporting Codes	t-test			Anova F-test			MannWhitney		Constant Mean Return
	df	t-statistic	p-value	df	F-statistic	p-value	Value	p-value	
Soccer	15338	13.55763	0.000	1.15338	183.8093	0.000	103.9013	0.000	0.000128
Cricket	15338	-8.77126	0.000	1.15338	76.93511	0.000	101.9159	0.000	0.000152
Rugby	15338	-14.05787	0.000	1.15338	197.6236	0.000	104.2932	0.000	0.000144

Table 4: Regression results according to sporting codes

	Soccer		Cricket		Cricket		Rugby		Rugby	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
C	0.000104	0.0362	9.28E-05	0.0622	0.000103	0.0365	9.55E-05	0.0532	0.000109	0.0264
Win	-5.7E-05	0.8826	0.000422	0.1374	N/A	N/A	0.000454	0.2263	N/A	N/A
Lose	0.000224	0.6468	N A	N A	0.000135	0.7175	N A	N A	-0.000567	0.2395
R-Squared	0.000030		0.000288		0.000017		0.000191		0.000181	
F statistic	0.11518	0.890933	2.206887	0.137137	0.130929	0.717181	1.161173	0.226305	1.383519	0.239593
D-W	1.992471		1.996611		1.996123		1.993342		1.994007	
LM Test	0.141826	0.8678	0.102011	0.9030	0.102011	0.9030	0.136389	0.8725	0.136389	0.8725

Note: Author's calculations. Omitted category in the soccer regression is "draw".

5.4 REGRESSION ANALYSIS

As explained by MacKinlay (1997), the OLS regression model is commonly used in event study literature. The collective results for the regression analysis are presented in Table 4. This table includes the coefficients and p -values for each of the constant values, dummy variables denoting wins and losses, as well as a number of diagnostic information. Under the null hypothesis, sporting performance has no impact on the behaviour of market returns. When performing an OLS regression model, it is important to accommodate for market data that is most often autocorrelated and heteroscedastic. This study estimates the OLS regressions using White heteroscedasticity-robust standard errors that automatically corrects for any heteroscedasticity prevalent in the data, while the Durbin-Watson (D-W) and LM statistics are conducted to determine the presence of autocorrelation.

When compared to the descriptive results, the findings from the regression analysis suggest completely opposite conclusions. The coefficients for all win and loss dummy variables are statistically insignificant for soccer, cricket and rugby at all levels of significance. The R -squared statistics are also very low, suggesting that sporting performance, as a variable, does not explain price movements in market returns. In addition, the F -statistics show that, in all regressions, the explanatory variables are not jointly significant in explaining variations in stock market returns. Overall there is no evidence from the regression analysis that sporting performance has an impact on market returns.

The results for cricket and rugby suggest that markets have a small but positive response following a victory while only rugby causes markets to have a small but negative response following a loss. Despite the ability of victories and losses to increase or decrease, respectively, share prices, these increases and decreases are insignificant at a 10% level. However, for rugby, these results point to the possible existence of an asymmetric relationship between victories and losses, supporting previous literature on sporting performance and market returns (e.g. Edmans *et al.*, 2007; Benkraiem *et al.*, 2009; Mishra and Smyth, 2010). The regression results for soccer indicate that soccer performances have no influence on market returns and are statistically insignificant. These results are relatively surprising in light of psychological research finding that economically neutral, but psychologically important events such as the New York weather and changes in sleep patterns could influence market returns (Saunders, 1993; Kamstra *et al.*, 2000). Such research is less personal and probably has less effect on individuals when compared to the strong emotional impact that sporting performance has on individuals and the mood implications

thereof, especially in a country such as South Africa where sport is considered to be somewhat of a religion. One would expect sporting performance to have a much greater influence on stock market returns.

Some of the possible reasons why sporting performance has no impact on South African market returns could be due to the frequency of the data. The daily All-Share Price Index was used in this study over a 20-year period starting from 1 January 1990 to 31 December 2010. The large amount of daily data together with the limited amount of sporting results could have influenced the overall results. The reason for the limited amount of sporting results partly has to do with South Africa's international sporting ban that was only revoked in 1992, limiting the time-line to 18 years of international competition. The frequency of the data may also imply substantial noise in the data, thereby failing to pick up the cumulative effect of sporting success or failure. Individuals' responses to the results may be too small to overcome the noise experienced in the data. This in turn will limit the ability of sporting performance to explain variations in market returns.

Perhaps the insignificant results could be due to poor results classification, because of supporters allegiance biases (Edmans *et al.*, 2007). Boyle and Walter (2003) explain that if supporters expect their team to win, there may be very little or no mood improvements if their team ends up winning the game. In such an instance, a result classified as 'positive' is more accurately classified as neutral, resulting in a downward bias for positive returns. But, if supporters are pessimistic and their team loses a game, this could result in little or no change in their mood. In this case, a result classified as negative would be more accurately classified as neutral, causing an upward bias in negative returns. It would be difficult to test such an assumption because of the impossibility of measuring any given fan's expected results for a particular match with the available data. However, given South Africa's perceived status in international sport, especially for cricket and rugby, the possibility of these biases cannot be excluded.

Other possible reasons for the insignificant regression results could be because the personalisation of sporting results has an offsetting effect on investor behaviour. According to Boyle and Walter (2003), with supporters basking in reflected glory and wallowing in reflected failure after sporting performances, this could result in investors being more aware of the source of their emotion. South African investors could be more aware of their emotional state, providing them with the ability to resist such irrational impulses. It may also be the case that in South Africa, supporters and investors belong to mutually exclusive groups. This is a plausible explanation for the soccer results. A study by Trevor Chandler and

Associates (2011) found that the total number of black South African economic interest on the JSE is approximately 17%. With the majority of soccer supporters being black South Africans, this could possibly explain soccer's inability to affect market prices. This, however, is not a plausible assumption for cricket or rugby, which according to www.safrinow.com remain predominantly 'white' supported. According to Trevor Chandler and Associates (2007), the remaining market share on the JSE available for South Africans after foreign investors and shares held by the treasury have been deducted is 54%. This is over half of all trades made on the JSE; therefore, should have the ability to influence market prices. Finally, it is possible that factors such as fluctuating currencies and political instability in South African markets over-shadow sporting performances in the eyes of investors, thereby making sporting performance a small predictor of the movement of stock market returns.

5.5 SUMMARY

This chapter has analysed the data on share prices and sporting performances and found the descriptive results to yield statistically significant results. After calculating the constant mean return values for each of the three sports, soccer, cricket and rugby, these results were then compared to returns on trading days following given sporting matches. The abnormal returns were found to be significantly different from the constant returns. This study then performed an OLS regression analysis on all three sporting codes and found that while cricket and rugby results were positively associated with stock returns after a win and negative after losses for rugby only, all coefficients were statistically insignificant. Only rugby exhibited a possible asymmetric relationship between wins and losses, yet this result was also insignificant. Therefore, the overall results suggest that South African sporting performance does not significantly influence market movements on the all-share index.

Chapter 6: Conclusion

The main goal of this study was to determine whether national sporting performance in South Africa has the ability to influence investor mood to such an extent that it causes abnormal market returns on the JSE. The first chapter provided a discussion of behavioural finance and, compared it to the efficient markets hypothesis and how the former incorporates both economic and psychological research in an attempt to explain economic anomalies. While this research agrees that behavioural finance is still in its infant stages and not yet ready to take over from the efficient markets hypothesis, behavioural finance continues to gain interest among the economic elite in the finance world. This study then investigated how mood could influence the way in which an individual behaves. Upon researching various psychological studies, it was discovered that mood could in general influence an individual's risk preferences. Individuals in a negatively induced state of mind tended to be more risk averse while those who had a positive state of mind induced tended to become more risk prone. This study also identified an asymmetric relationship between positive and negative events, with the latter having a much greater ability to influence the way individuals think, react to different situations and make decisions.

The principal motivation for this research was the ability of *non-economic* events to influence market prices. Research by Saunders (1993) and Kamstra *et al.* (2000), among others, reported evidence that non-economic events could influence market returns. The amounts of cloud cover in New York City together with changes in sleep patterns and Seasonal Affective Disorders (SAD) during the winter months were all linked to abnormal market returns. As sporting performance was the main factor of interest in this study, it was necessary to determine whether sport could influence individuals' moods. This research found that individuals tend to associate themselves with successful teams or individuals, in a process known as 'basking in reflected glory' (BIRGing) (Cialdini *et al.* 1976). This so called 'basking' was done to improve the individual's social status within society. It was also discovered that the greater a fan's identification with a specific team or individual, the greater the impact a win or loss would have on an individual's mood. Match results were also found to influence the way individuals perceive themselves and their future; and, had the ability to affect their decision-making abilities.

While the ability of sporting *events* to influence markets has been well documented over the years, very little had been done concerning sporting *performance* and its ability to influence market returns. Against this backdrop, this study investigated economic literature regarding sporting performance as a non-economic event and its ability to influence markets. These findings proved to be statistically significant for a variety of sports ranging from American football in the United States, soccer in Europe, one-day cricket in India and the Melbourne Cup in Australia. These findings also proved to be asymmetric in nature with losses resulting in greater abnormal returns when compared to wins. Only results for the *All Black* rugby team in New Zealand proved to have no significant effect on market returns. However, the evidence also suggested the strong possibility that stock returns could be linked to the national sporting performance.

The time-line used in this study ranged over a 20-year period, from 1 January 1990 to 31 December 2010. This study also used daily All-Share prices indices on the JSE together with detailed descriptions of all matches played by the South African national soccer, cricket and rugby teams since 1992. These three sporting codes were chosen because they are the three most popular sports in South Africa, according to a national survey, and also satisfy the three rules, described by Edmans *et al.* (2007), required by any sport if it is to be considered as a variable. The available evidence seems to indicate that soccer remains the most popular sport in South Africa, followed by cricket and rugby.

To determine if sporting performance in South Africa could influence market returns on the JSE, this study used standard event study methodology. The descriptive analysis indicated statistically significant differences between abnormal returns and constant returns for all three sporting codes. Therefore, returns on trading days following matches were found to be statistically and significantly different to the constant mean return, suggesting the possibility that sporting performance could influence stock returns.

In contrast to the descriptive findings, the regression analysis indicated no significant relationships between sporting performance (of either sporting code) and stock return movements. While rugby was the only sport to show some evidence of an asymmetric relationship between positive and negative results and the only sport to cause market returns to increase after a win and decrease after a loss, the coefficients were not statistically significant. From these results, it can be deduced that while abnormal market returns on trading days following sporting fixtures are statistically significant from the constant mean returns of all other days, sporting performance has nothing or very little to do with this outcome. This argument is further supported by the fact that sporting performance explains a

very small proportion of market returns. As explained in detail in Chapter 5, possible reasons for the inability of sporting performances to affect market returns in South Africa could be that the amount of noise in the data over-shadows the cumulative effect of sporting success or failure due to the limited number of matches for each sport since 1992. Perhaps South African fans are more aware of the source of their emotions and better equipped to control irrational impulses.

One possible recommendation for future research is to use alternative models for measuring normal performance instead of using the constant mean return. The 'Market Model' relates the returns of any given security to the return of the market portfolio. This model represents a potential improvement on the constant mean return model. Further research could also consider a Generalised Method of Moments (GMM) model instead of OLS since the GMM estimator automatically accommodates for autocorrelated and heteroscedastic market data, provided the availability of appropriate instruments. Finally, another aspect for future research is refining and controlling for noise in the data. This would allow small cumulative changes in markets returns due to sporting performance to be more pronounced, thereby allowing regression based analyses to determine a stronger association between market returns sporting performance in South Africa.

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