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Master Thesis

"Corporate Social Responsibility (CSR) and Stock Price – An Event Study Approach"

Student Name: Marios Papaminas

Supervisor

Dr. Stelios Markoulis

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Abstract

Corporate Social Responsibility can bring real business benefits by reducing risk, by enhancing brand value, by opening doors and creating good will, and by improving staff efficiency and morale. Nevertheless, there remains a protracted debate about the legitimacy and value of corporate responses to CSR concerns. Knowledge about the effect of Corporate Social Responsibility on corporate financial performance contributes to the debate about whether managers systematically miss profit opportunities if they decide against it. There are different views about a firm's role in society and disagreements as to whether wealth maximization should be the sole goal of a corporation. Using extensive data over a time period, this study will explore and test the sign of the relationship between corporate social responsibility and financial performance. More specifically, the purpose of this study is to examine whether Corporate Social Responsibility (CSR) announcements or events, have any effect on a firm's stock returns. The stock market reaction is considered the most effective way to verify this relation and will be tested using the event study methodology. The study will contribute to the existing body of knowledge on CSR and stock prices. The findings of this study will aid corporate executives to understand the importance of CSR in governance and decision making processes. The results aim at persuading managers to implement CSR actions in a greater extent in order to enhance their firm stock value.

The first part of this dissertation aims to familiarize the reader with the concept of Corporate Social Responsibility, and formulate an opinion whether Corporate Social Responsibility is positively correlated with real business benefits and identify areas for improvement driving towards financial performance. To achieve this, an in depth review of the available literature is conducted.

The second part is the empirical section, and using the event study methodology investigate how Corporate Social Responsibility (CSR) announcements or events affect stock returns. The impact on the stock price may imply negative, neutral or positive linkages.

Περίληψη

Η υλοποίηση σωστής Εταιρικής Κοινωνικής Ευθύνη από ένα οργανισμό, μπορεί να φέρει απτά οφέλη, μειώνοντας τους επιχειρηματικούς κινδύνους, ενισχύοντας τη χρηματική αξία της επωνυμίας του, ανοίγοντας πόρτες σε ευκαιρίες, δημιουργώντας «καλή θέληση» αναμεσά στις αγορές που δραστηριοποιείται και εντέλει να βελτιώσει την παραγωγικότητα και το ηθικό των υπαλλήλων του. Παρόλα αυτά, υπάρχει μια παρατεταμένη συζήτηση σχετικά με τη νομιμότητα, την αντικειμενική αξία και το τρόπο που οι εταιρίες ανταποκρίνονται στο κάλεσμα για υλοποίηση δράσεων Εταιρικής Κοινωνικής Ευθύνης. Η πρόσφατη εμπειρία από την επίδραση της Ε.Κ.Ε. στις εταιρικές οικονομικές επιδόσεις, έχει συμβάλει στην ανάπτυξη μια επιχειρηματολογίας ως προς το κατά πόσο αν χάνονται σημαντικές ευκαιρίες κέρδους σε περίπτωση που τα διευθυντικά στελέχη αποφασίσουν εναντίον της υιοθέτησης μιας εταιρικά υπεύθυνης προσέγγισης. Υπάρχουν διάφορες απόψεις για το ρόλο της επιχείρησης στην κοινωνία, που οδηγούν σε διαφωνίες κατά πόσο η μεγιστοποίηση του κέρδους πρέπει να είναι ο μοναδικός στόχος μιας εταιρείας.

Χρησιμοποιώντας εκτενή οικονομετρικά δεδομένα, αυτή η μελέτη θα διερευνήσει και θα αποπειραθεί να αποτυπώσει το πρόσημο μεταξύ εταιρικής κοινωνικής ευθύνης και οικονομικών επιδόσεων. Πιο συγκεκριμένα, ο στόχος αυτής της μελέτης είναι να εξετάσει κατά πόσον ανακοινώσεις ή γεγονότα Εταιρικής Κοινωνικής Ευθύνης (ΕΚΕ), έχουν οποιαδήποτε επίδραση στις αποδόσεις των μετοχών μιας επιχείρησης. Η αντίδραση της χρηματιστηριακής αγοράς θεωρείται ο πιο αποτελεσματικός τρόπος για να διερευνηθεί αυτός συσχετισμός. Για το έλεγχο της υπόθεσης μας, θα χρησιμοποιήσουμε τη μεθοδολογία μελέτης γεγονότος. Η μελέτη θα συνεισφέρει στην υπάρχουσα βιβλιογραφία μελέτης συσχετισμού μεταξύ ΕΚΕ και των τιμών μετοχών. Τα ευρήματα αυτής της μελέτης προσβλέπουν να βοηθήσουν τα εταιρικά στελέχη να κατανοήσουν τη σημασία της ΕΚΕ στις διαδικασίες διακυβέρνησης και λήψης αποφάσεων. Τα αποτελέσματα αποσκοπούν να πείσουν τα παραπάνω στελέχη ως προς τα πλεονεκτήματα που απορρέουν από την εφαρμογή δράσεων εταιρικής Κοινωνικής Ευθύνης, προκειμένου να ενισχύσουν τη σταθερή αξία των αποθεματικών τους.

Το πρώτο μέρος αυτής της διατριβής έχει ως στόχο να εξοικειώσει τον αναγνώστη με την έννοια της Εταιρικής Κοινωνικής Ευθύνης, και πραγματεύεται την άποψη εάν Εταιρική Κοινωνική Ευθύνη συσχετίζεται θετικά με πραγματικά οφέλη για την επιχείρηση,

εντοπίζοντας πιθανούς τομείς που επιδέχονται βελτίωση. Για να επιτευχθεί αυτό, γίνεται ανασκόπηση της διαθέσιμης βιβλιογραφίας.

Το δεύτερο μέρος της διατριβής είναι η εμπειρική ενότητα, όπου και χρησιμοποιώντας τη μεθοδολογία της μελέτης γεγονότος, θα προσεγγιστεί ο τρόπος που ανακοινώσεις ή γεγονότα Εταιρικής Κοινωνικής Ευθύνης (ΕΚΕ) επηρεάζουν τις αποδόσεις των μετοχών. Η επίπτωση στην τιμή της μετοχής μπορεί να συνεπάγεται αρνητικό, ουδέτερο ή θετικό πρόσημο.

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I wish to take this opportunity to express my deepest thanks to my dear family for the love and never-ending support they have extended me in every step of my life. Finally, I am grateful with all the friends and persons which supported me during this period.

Marios Papaminas
May 2016

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Chapter 1
Introduction

1.1 Background

The business impact and its interaction with social and environmental issues has emerged over time. As a result, the concept of Corporate Social Responsibility (CSR) has been promoted and gained momentum from the majority of the companies around the globe.

There is not one acceptable definition of CSR, so the very actions of it, differ among countries, regions, societies, and communities. Some focus on the ethical actions of management, others on sustainable development, some on environmental impact and others on philanthropy. In a few words, CSR can be seen as the voluntary actions that a business can take, over and above compliance with minimum legal requirements, to address both its own competitive interests and the interests of the wider society.

The increased awareness of CSR, motivated several Global and European organizations to promote several CSR tools and initiatives. For example, in 1997 the Coalition for Environmentally Responsible Economies founded the Global Reporting Initiative with the aim to create a measurement device in terms of sustainability factors in a similar way with the one that measures financial aspects (Willis, 2003). On the other hand, in 1999 the United Nations launched a social and environmental supporting program called "Global Compact" with the aim to create international cooperation between private corporations and the general public. Finally, the European Commission in 2002 released its first communication on CSR, which included the definition of CSR, the creation of a European Multi-stakeholder Forum on CSR, and how the Commission itself relates CSR to certain European policies (CSR Europe, Website).

There are several factors cited as being important in constructing the current momentum behind CSR. Ernst and Young (2002) declare that three key drivers have influenced the increasing business focus on CSR. First of all, the greater stakeholder awareness of

corporate ethical, social, and environmental behavior; secondly, direct stakeholder pressures, investor pressure; and finally, peer pressure and an increased sense of social responsibility.

Moreover, there are various factors that seem to influence a company's approach to CSR. Some of them are: the region, nation, industry, and company. Though, according to Fox (2004) the most important factor influencing a company's approach to CSR is stakeholders' expectations.

However, meeting stakeholders' requirements is just a basic acknowledged contribution of CSR. Nowadays, companies adopting CSR strategies can also have some direct and indirect benefits. Some of these benefits are: enhanced reputation, employee satisfaction and loyalty, improved financial performance and profitability, reduced operating costs, long-term sustainability for companies and their employees, good relations with government and communities, better risk and crisis management, the development of closer links with customers and greater awareness of their needs.

Furthermore, there are some important research studies that claim that CSR benefits both the community and the company. Due to the fact that CSR enables business to improve their corporate culture and corporate names, leads to the possibility to attract the best employees and also motivate the workforce to retain them in business. While providing these benefits to the company the society benefits from the CSR work, which could consist of a variety of services and actions, though it has to create some sort of social benefit in order to be called CSR. From the arguments above, it can be deducted that companies may have diverse motivations that influence the decision to implement CSR. Similarly, CSR approaches may also differ from company to company.

On the other hand, and in contrast to the above, many economists have publicly criticized and attacked the CSR concept. One of the first, and probably the most famous economists against CSR is Milton Friedman. On September 13, 1970, the New York Times published an article by Milton Friedman in which he declared:

"There is one and only one social responsibility of business, to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud."

This is the orthodox view among free market economists where the firms are expected to strive in order to achieve the greatest possible economic profit. From there onwards it becomes the government's responsibility to use appropriate regulation to prevent or correct any subsequent wrongdoing, such as social exploitation or neglect of the environment.

1.2 Areas of Corporate Social Responsibility

CSR is neither philanthropy nor a study of business ethics. It can instead be described as a vision that business leaders have besides making money. It has an impact on everything that the company does and will affect areas either inside or outside the company.

Subsequently, it can be divided into four different areas:

- The environment;
- The workplace;
- The community;
- The marketplace;

These four areas are what companies focus on, work with, and develop special programs within. These areas will also have an impact such as monitoring and changing the way they do business within the company.

1.3 Problem Statement

A conducive and friendly social and business environment will enable corporations to achieve their main objective of profit and shareholders 'wealth maximization. According to Cramer (2003), CSR implementation can provide opportunities to a firm and lead to added value. Holmes (1976), stated that improved reputation and enhancement of social community are the most expected positive results of CSR while the decrease of short- run profitability and conflict among social and financial goals are the possible negative outcomes in the view of executives. Van Dijken (2007), argued: stock markets will not

value positively charitable and unpublicized contributions by a firm unless they have impact on the firm‘s reputation. CSR activities may help companies gain a possible listing on the stock exchange, or other similar listing. This may enhance the value of a company‘s stock.

The relationship between CSR and corporate stock prices has been documented in the literature to date. Ideally, CSR and firm stock prices should be correlated, but studies on CSR and stock prices have yielded mixed results – positive, negative, and neutral impact. There are studies that concluded that the contradictory results of previous studies reporting positive, negative, and neutral financial impact, were due to flawed empirical analysis. McWilliams and Siegel (2000), compared existing econometric studies of the relationship between social and financial performance and concluded that when the model is properly specified; that is, when you control for investment in Research and Development, an important determinant of financial performance, CSR has a neutral impact on financial outcomes. However, Orlitzkyetal, (2003), found a correlation between social/environmental performance and financial performance. A firm's implementation of CSR goes beyond compliance and engages in "actions that appear to further some social good, beyond the interests of the firm and that which is required by law.”

Although there has been substantial research in developed countries on corporate social responsibility and corporate stock prices, this study aims to contribute to the existing body of knowledge on CSR and stock prices. The findings, will aid corporate executives to understand the importance of CSR in governance and decision making processes. The results aim at persuading managers to implement CSR actions in a greater extent in order to enhance their firm stock value.

Chapter 2
Literature Review

2.1 Introduction

This chapter will present a selection of the literature that is relevant to the topic of CSR and especially to the objectives of the research. Primarily, the aim will be to present the theoretical definitions of corporate social responsibility, including their drivers, criticism and its relationship with shareholders. The last part of this chapter will include a review of empirical research studies relevant to the project methodology.

2.2 CSR Definition

Castka et al. (2004:216) state that: "there is no single authoritative definition of CSR. The CSR concept seems to be a loosely defined umbrella embracing a vast number of concepts traditionally framed as environmental concerns, sustainable development, public relations, corporate philanthropy, human resource management and community relations".

CSR as a phrase, has been more and more commonly used during the recent decades; as a result this has triggered continuous debate about its meaning, approaches and terminologies. CSR is a concept then, which contains several issues. Frankental (2001:20) has argued "*CSR is a vague and intangible term which can mean anything to anybody, and therefore is effectively without meaning*".

The first recognised definition of CSR can be traced to Bowen (1953) and his book Social Responsibilities of the Businessman. In Bowen's book, CSR is defined as "*an obligation to pursue those policies, to make those decisions, or to follow those lines of action that are desirable in terms of the objectives and values of our society*" (Bowen 1953: 6). Moreover, the writer suggests that businesses exist at the pleasure of society, therefore their

behaviour and operations should follow the guidelines set by society; and on the other hand, companies also act as moral agents in society.

Another definition of this broad and important concept was given by Carroll (2004:116) who stated that "*the social responsibility of businesses encompasses the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time".*

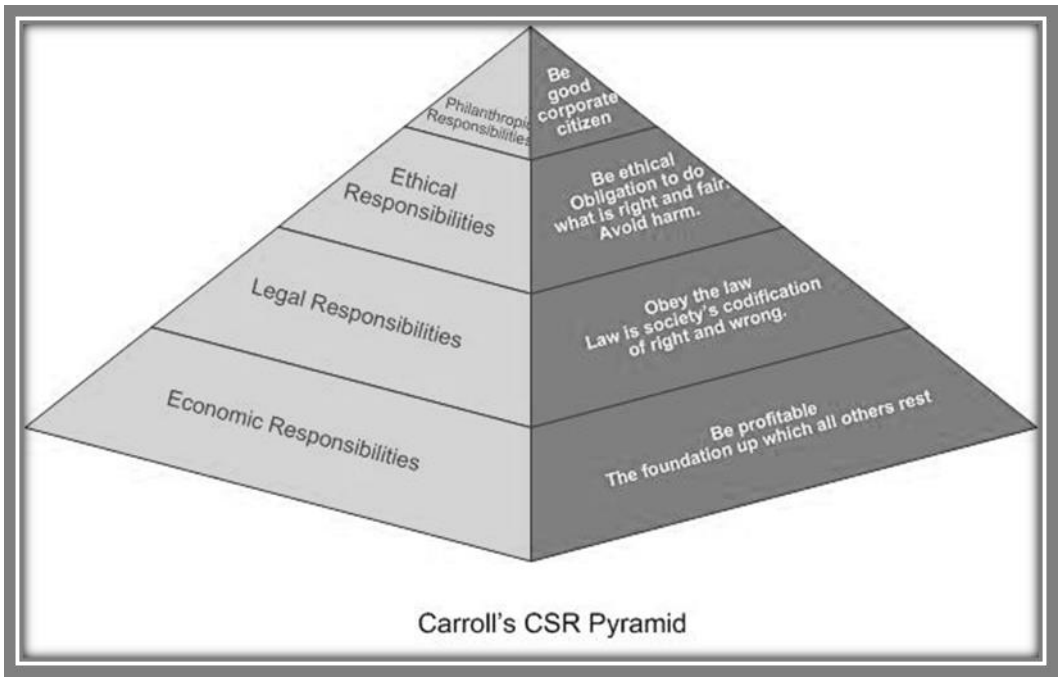


Figure 1. Carroll's CSR Pyramid (1991:p.42)

Concluding, by comparing the various definitions of CSR it's obvious that most of them have in common the idea that businesses should make decisions that are committed to social and environmental issues and that go beyond their legal obligations.

2.3 Drivers of CSR

A variety of factors are cited as being important in building the current momentum behind CSR. According to the results of a global survey in 2002 by Ernst & Young, 94 per cent of companies believe the development of a Corporate Social Responsibility (CSR) strategy can deliver real business benefits, however only 11 per cent have made significant

progress in implementing the strategy in their organisation. Senior executives from 147 companies in a range of industry sectors across Europe, North America and Australasia were interviewed for the survey. The survey concluded that CEOs are failing to recognise the benefits of implementing Corporate Social Responsibility strategies, despite increased pressure to include ethical, social and environmental issues into their decision-making processes. Research found that company CSR programs influence 70 per cent of all consumer purchasing decisions, with many investors and employees also being swayed in their choice of companies. "While companies recognise the value of an integrated CSR strategy, the majority are failing to maximise the associated business opportunities," said Andrew Grant, Ernst & Young Environment and Sustainability Services Principal. "Corporate Social Responsibility is now a determining factor in consumer and client choice which companies cannot afford to ignore. Companies who fail to maximise their adoption of a CSR strategy will be left behind."

Paine (2003) claims that organisations have various motivations to adopt CSR. These motivations can vary from meeting basic compulsory legal requirements aimed at controlling destructive business practices to consideration of CSR as a tool for increased productivity and improved economic performance. Moreover, she states that functional areas such as risk management and market positioning are also expected to improve with increased attention to CSR. Similarly, Andriof and McIntosh (2001), identify a number of principles that are set to be the foundation to why businesses implement CSR. They argue that it is about making a difference in society in order to reach sustainable success, both in business and society. To ensure this, everybody associated with the company such as employees and stakeholders, have to be allowed to contribute. This inclusion of the employees and stakeholders requires a long-term philosophy with a transparent organization, which will be beneficial in the long run. It is a continuous communication and shared responsibility between society, business, and government to create an engagement to achieve a sustainable social, environmental, and economic success. All these have to be done without losing profitability.

However, the author's opinion is that the main driver behind the implementation of any CSR strategy is the direct and indirect benefits that an organisation can gain by using CSR as a marketing tool.

2.4 Benefits of CSR

The business case for CSR seems to focus on a wide range of potential benefits. Mackey & Barney (2007) argued that there are perceived benefits of surpassing the minimum CSR requirements. They found that by employing CSR a statistically significant positive effect on a company's performance and value could be observed.

Kotler & Lee (2005:10-11) present a more extensive list of potential benefits, which are connected to CSR. These benefits are the following:

- Enhanced reputation
- Employee satisfaction and loyalty
- Enhanced product lifecycles
- Improved risk management due to a wider audience
- Innovation improvements
- Higher probability to attract investments
- Supports marketing objectives
- Contributes to general business goals
- Reduces operating costs
- Reduces regulatory oversight
- Builds strong community relationships

It must be stressed out, that the environment in which each company operates is different and is always changing, so any benefits from a CSR strategy will never be constant or predictable. Barnett (2007) states that "this unpredictability could lead to limited support for CSR initiatives from the board in times of financial instability".

The business case supporting CSR will be company specific and, according to Rowley and Berman (2000) it is not possible to judge the CSR achievements against a standard benchmark, since there are none. McWilliams and Siegel, (2001) claim that if there was a standard benchmark, it would allow a company to judge their business case in a more formal way and allow CSR to be considered as part of investment decisions.

2.5 Criticism of CSR

On the other side of the fence, there are those who champion the case against companies integrating CSR into their core business and believe that running a "good" business contradicts with shareholders interest.

Such arguments might follow Friedman (1982:112) in affirming that ". . . there is one and only one social responsibility of business is to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say engages in open and free competition without deception or fraud". According to this economic model, a manager who uses a firm's resources for social purposes that are not profitable is thought to be diverting economic efficiency and imposing an "illegal tax" on the organisation.

Dr Robert Barrington (2008) seems to agree with Friedman (1982) and as he stated in Times there is criticism that CSR can actually cost shareholders money as it distracts management by getting them to concentrate on soft issues, rather than the hard issue of the bottom line. Furthermore, there are people who believe that CSR is simply an attempt to buy good PR or philanthropy under another name. If indeed corporate responsibility is unproductively distracting management or demanding unproductive investment it is against the interests of shareholders.

Henderson (2008) has argued that seemingly growing business commitment to CSR is "deeply flawed" in that "*it rests on a mistaken view of issues and events and its general adoption by business would reduce welfare and undermine the market economy".* In addition, Moir (2001:2) suggests that the neo-classical view of corporations'

responsibilities is that business should provide employment, pay taxes and the most important to maximise the value to their shareholders within the rules of the game, but not anything more than that.

2.6 Factors influencing CSR approach

In general, the differences of CSR approach noted in the literature can be grouped in four different levels: region, nation, industry and company. Baughn et al (2007) for instance, argue that in the regional context, the incidence of policies on CSR reporting in America was lower than Europe since the European region tends to have more forceful regulatory environment than America where CSR is favoured in a voluntary form. However, we need to note that the relationship among these four contexts is not independent. For example, at the firm level, the intensity of commitment to CSR is influenced by individual and organisational factors but also by national and transnational players and agencies (Aguilera et al., 2005).

Chapple and Moon (2005) state that at a national level, there is substantial variance in cultural, economic, environment and political country contexts, which will be reflected in the level of support of CSR and the types of activity promoted by firms in particular countries. For instance, Singapore has improved concerns about environmental policy because of its small size and dense population (Kimber and Lipton, 2005). On the other hand, in Norway, company policies regarding local population are reflected by the local condition that there is a large minority indigenous population in the northern part of the country (Welford, 2005).

Moreover, most of the research at industry level has focused on sectors generally acknowledged as problematical in environment issues most notably the chemical industry, the automotive industry, the forestry/pulp/paper sector, and the energy sector; whereas other industries that have much smaller environmental impact are less addressed, especially the service sector. Commonly adopted approach for Regulators is to focus attention on industries that have greater environmental impacts. (Etzion,2007). Industry-specific characteristics are vital elements when conducting market-level (across-industry) analysis to control for industry-level variance. Some researchers also

address social issues at industry level. For example, Araya (2006) found that social and environmental reporting is more common in internationally oriented and socially and environmentally sensitive industries in Latin America.

To conclude then, according to Henriques and Sadorsky (1996), at the company level, there are several factors influencing CSR practices such as internal conditions, strategic attributes, contingency attributes and stakeholder pressure. For example, firm size and community responsiveness have been found to be an important influence on CSR practices. On average, bigger firms tend to give more to charity (Brammer and Millington, 2002).

2.7 CSR and Stakeholders

CSR encourages companies looking after their stakeholder interests Johnson, Scholes and Whittington (2008) definition of the corporate CSR concept contains the words "obligation to stakeholders", which illustrate the importance of stakeholders in this area. According to Johnson and Scholes (2008:132), "*Stakeholders are those individuals or groups who depend on the organisation to fulfil their own goals and on whom, in turn, the organisation depends*". Though, conflicting interests from different stakeholders are common and usual, compromises between the different stakeholders' expectations are reached, because obviously all expectations cannot be achieved at the same time.

When implementing CSR in a business strategy it is significant to identify the stakeholder groups that the organisation has and also must give priority between the different stakeholder groups. Organisation stakeholders are separated into primary and secondary stakeholders, where the primary are those who have a direct interest in the organisation and the secondary have an indirect interest. Primary stakeholders are the customers, employees and investors while secondary stakeholders are the suppliers, interest groups, society, competitors and media.

Castka et al. (2004) supports the idea that there are two different perspectives that are mentioned in conjunction with CSR and the relation towards an organisation's

stakeholders: The instrumental approach and the normative approach .The instrumental approach means that the concern for stakeholders lays in the belief that CSR can improve financial performance. Taking into consideration the normative approach the organisation should work with CSR activities from a strictly ethical perspective, making sure that all actions are being executed with high integrity from the stakeholders' perspective.

Furthermore, Berman et al. (2000) claim that it is only the instrumental approach that is supported empirically, however Harrison and Freeman (1999) (cited in Castka et al., 2004) state that more research has to be conducted within this area in order to reach any further conclusions about the normative approach. Even though more research is desirable, it is evident that the instrumental approach is the most well established one among researchers and according to Agle et al. (1999) (cited in Castka et al., 2004) the decision to make a CSR investment is founded upon the basic interest of the strongest stakeholders within the organisation, such as decision makers on the top of the hierarchy, which is often connected to the intention to make a profit or achieve an increased market share.

Finally, in line with the above, Castka et al (2004) suggest that CSR should not be treated differently than other investments. Further, they argue that the main thing to strive for in concern to stakeholder theory is finding the perfect balance between maximising the profit from CSR, while satisfying the demand for CSR from the different stakeholders. Finally, they recommend that organisations should assess the stakeholder's expectations through dialogue and encompass these expectations into the business CSR strategy.

2.8 Empirical Research on CSR and Financial Performance correlation

A vast amount of research has been focused on determining the financial effect of corporate social actions during the last 25 years. A review of that literature shows that a consistent, accepted, operational definition of Corporate Social Responsibility has yet to be developed. In the absence of an accepted measure of corporate social responsibility,

different researchers developed their own measures, making comparisons difficult. Most studies show inconclusive results concerning empirical links between social and financial performance.

Early studies failed to consider features such as dividends' contribution to stock returns and risk. Moskowitz (1972), Vance (1975), Abbot et al (1979) and Alexander & Buchholz (1979) corrected these problems by examining stock market performance and CSR adjusted for risk. They found '... no significant effect of social responsibility on stock market performances" (Alexander & Buchholz 1979:481). However, because they did not perform an actual "event analysis", they were unable to ascertain whether new information released to the market concerning a particular firm's CSR led to an immediate market reaction.

Anderson et al (1980) examined Fortune 500 companies' stock market returns on a monthly basis, comparing firms that voluntarily disclosed social responsibility information and those that did not. They found that firms voluntarily disclosing CSR earned higher returns. Anderson et al (1980) contend that voluntarily disclosing social responsibility offers important information. However, because Anderson et al (1980) study did not contain a daily event analysis they failed to demonstrate a direct link between CSR disclosure and higher returns.

Brammer, et al (2006) examined the relation between corporate social performance and long-term stock returns with UK data and came to the conclusion that companies scoring high on CSR appear to be poor investments. Specifically, they studied social performance scores on three different criteria: employment, environment, and community. Their analysis showed that companies with high scores over all three investment horizons have considerably lower average returns than the benchmarks and that, financially meaningful yet statistically insignificant abnormal returns can be achieved by holding a portfolio of the socially least desirable stocks.

Geczy et al (2006) evaluated whether investors pay a price for investing in socially responsible mutual funds and found the key factors to be the fraction of their portfolios restricted to Socially Responsible Investment (SRI) funds and their prior beliefs about

pricing models and manager skills. When the investor believes in multifactor models or when he believes that fund managers have skill, then the costs of SRI can be economically significant. The SRI constraint can impose diversification costs. Investors who believe in fund managers‟ stock-picking ability", search return histories to identify such skill, but they incur costs because the funds with the best track records are not included in the investment universe of SRI funds. The costs for investing in SRI funds are especially high when the investor allocates his entire portfolio to those funds, but substantial also for an investor who allocates only a third.

The performance of socially responsible mutual funds is also addressed by Hamilton et al (1993), who found that socially responsible mutual funds do not outperform or under-perform a benchmark group of conventional mutual funds. The author's state: "... the market does not price social responsibility characteristics" (Hamilton et al 1993: 66). Studies that evaluate the performance of mutual funds are not only evaluating the performance of the individual firms within the fund, but also the performance of the mutual fund portfolio manager. This type of analysis does not examine the reaction of investors to corporate social actions and may offer misleading information to investors and corporations.

A research paper that has many similarities to this project is by Flammer (2012). The research is an event study examining news announcements related to the environment for U.S. publicly traded companies from 1980 to 2009 with interesting findings. Companies reported to behave responsibly towards the environment (positive news event) experience a significant stock price increase, whereas firms that behave irresponsibly (negative news event) face a significant stock price decrease. Another interesting aspect with this study is how these abnormal returns have changed through time. The paper deals with data from 1980, and the results show that the focus on environmental behaviour increased dramatically in the last decades. On the other hand there is a visual shift in the "norm"; over time, the positive reaction to a positive news event has decreased, while the negative reaction to a negative event has increased. The paper also finds that the positive (negative) stock market reaction to eco-friendly (harmful) events is smaller for companies with higher levels of environmental CSR.

Boulatoff and Boyer (2009) studied the performance of environmental stocks. Their results suggest that, on aggregate, NASDAQ performed better than "green firms". However, since environmental industries are growing, Boulatoff and Boyer believe that their results may improve in the long run. Currently, solar, wind and water industries are already leading NASDAQ.

In another study, Shen and Chang (2009) examined the effect of CSR on firm's financial performance in Taiwan. Their results were mixed but in general, suggest that adopting CRS at least does not deteriorate the performance of firms.

Adding to the contradictory results, there are several studies that show evidence of socially responsible funds and stocks out-performing conventional stocks e.g. Konar and Cohen (2001), Statman (2000), Cheung et al (2010). Konar and Cohen found evidence suggesting that there is a significant and positive relationship between environmental performance and the intangible asset value of publicly traded firms in the S&P 500, which they interpret as a sign that the market values environmental performance and companies are rewarded for taking environmentally responsible actions. They extended the standard economic technique of decomposing a firm's market value into its tangible and intangible assets by separating out environmental performance from the intangible assets of the firm. Meir Statman (2000) presented the Domini Social Index (DSI), which is a capitalization-weighted index of stocks of socially responsible companies initiated in 1990 by Kinder, Lydenberg, Domini & Co and modeled on the S&P 500 Index to be used as a benchmark for portfolios practicing social screening. Then, he compared the performance of the DSI and the S&P 500 index by comparing returns, calculating Jensen's alphas and a modified version of Sharpe ratio called "excess standard-deviation-adjusted return". The socially responsible mutual funds performed better than conventional mutual funds over the period of 1990-1998, but the differences in their risk-adjusted returns are not statistically significant.

The importance of CSR in Asian Emerging Markets was also studied by Cheung et al (2010), but in contrast to the findings of Shen and Chang (2009), they found a significant positive relation between CSR and market valuation among Asian firms. Whereas Shen and Chang concentrated on companies listed in the Taiwan Stock Exchange, Cheung et al.

included major firms listed in the Asian Emerging Markets in their dataset. A broader dataset can lead to different results, especially when the sample comprises of companies from different markets.

Other studies focus on firms' financial performance as measured by various accounting rates of return. A study by Curzio and Wolf (1996) finds that firms adopting an environmentally responsible strategy appear to significantly enhance their financial performance. Several authors point out the unsuitability of these types of studies for analysing CSR and financial performance [Davidson et al (1990); and Cochran & Wood (1984)]. Davidson et al argue that there are several problems inherent in working with specific measures of profitability such as "... industry and regulatory differences, accounting and demographic differences, risk, leverage, inflation and timing. Furthermore, accounting variables do not directly measure owners' wealth" (Davidson et al 1990: 8). For instance, company results across regulated and non-regulated industries may be meaningless. The timing of accounting data is also problematic, as accounting reports are typically published on an annual or quarterly basis. Also, accounting data does not serve as a measure for owners' wealth, whereas stock returns do measure the stockholders' wealth directly. Additionally, daily market data allows one to pinpoint the effect, if any, of an event upon stock returns. Both studies support the suitability of event analysis as a method for exploring the relationship between CSR and shareholder wealth.

Chapter 3
Methodology

3.1 Event Study Framework

The event study methodology is designed to investigate the effect of an event on a specific dependent variable. A commonly used dependent variable in finance-related event studies is the stock price of the company (e.g. response to earnings announcements, stock splits, merger & acquisition speculation etc.). The definition of such an event study will be "A study of the changes in stock price beyond expectation (Abnormal returns) over a period of time (event window). We attribute the abnormal returns to the effects of the event.'

Dolly (1939), was the first to introduce event study analysis to the public. A testing sample included 95 shares, which were split in the period between 1921 and 1931. His research focused on the fluctuation of the stock price, which was probably caused by the stock split event. He documented that there were 57 splits that led the stock price to increase, 26 splits caused a decrease of the stock price, and found no changes in the remaining stocks. MacKinley (1997) provided a clear and compact guide through the methodology of event studies, though he did not explain the different sources and solutions of bias in an analytical manner. Another guide of event studies is found in Brown & Warner (1980), where they rather irradiate the impact of bias for the different approaches. They investigated these possible sources in a study of simulated samples using monthly data, and the study was later extended to the use of daily data by Brown & Warner (1985). In addition, Bartholdy et al (2006) investigated the event study methodology on smaller stock exchanges, where thinly traded stocks may cause methodological problems.

The event study methodology seeks to determine whether there is an abnormal stock price effect associated with a specific event. From this, the analyst could infer the significance of the event. The key assumption of the event study methodology is that the market must be efficient. Given an efficient market, the effects of the event will be

reflected immediately and accurately in the stock prices of the company. This will allow the observation of the economic effect of the event over a relatively short period. Moreover, during the analysis period, the event, which is the central research point, should be the only event that would have significant influence on the stock price changes. Finally, the consequence of the event should be measurable by the abnormal return rate.

The procedure of an event study comprises of the following steps:

1. Define the event in question
2. Determine estimation, event and post event windows
3. Download the historical files of both share price and stock market index data. The data files should contain the calendar dates of both estimation period and event period.
4. Calculate the daily returns of both individual share price and market index data.
5. Calculate the two parameter estimates of the "Market Model", Alpha and Beta by using the return generating model with the data from the estimation period. There are four popular and recognized models to calculate the normal rate of return, which are (a) Mean-adjusted return model[i], (b) Market-adjusted return model[ii], (c) Market model, (d) Constant return model.[iii]

   In this paper we will be using the *Market Model*. Our decision was based on recent meta research (Holler, 2014), which find that the market model is the predominantly used model for predicted normal returns. From a sample of 400 analyzed event studies, 79.1% of the studies used the 'market model', 13.3% drew on the 'market adjusted return model', 3.3% the 'constant mean return model', 3.6% 'multi-factor models', and 0.7% deployed the CAPM model.
6. Go to the event period and use the two parameter estimates (Alpha and Beta) to determine the (daily) expected return of the share price in the event period.
7. Calculate the (daily) abnormal returns, that is to say the actual daily return minus the expected daily return in the event period and then derive the cumulative abnormal returns.
8. Analysis of the abnormal returns; Carry out tests of statistical significance and explain the results.

3.2 Define the event in question

The absolute first step in the event study process is deciding what kind of events are of interest. For this project, we have pre-qualified some CSR events (negative and positive) from various industries, attempting to eliminate bias from focusing on an area which is possibly impacted by specific market forces.

3.3 Identify estimation, event and post event windows

The date of the event (T=0), also known as the announcement date, is considered as the day on which an event is reported. The actual date of the event may be different but that is not relevant (often that day is also the day on which the event becomes known). The point here is that before the announcement of the event, investors can't form accurate expectations regarding the future cash-flow effects of the event. An "event window" is defined as a period surrounding the event date; event windows that are subject to empirical testing may be denoted as test windows. An "estimation window" is defined as a period used to estimate parameters of the statistical model. It can be a pre-event, post-event, or pooled window. MacKinlay (1997) defines the estimation period as "the time period that is used to calculate the estimated return predicted by the market around the announcement date". This study uses an event window of 120 calendar days. The same time period will be used as "estimation window" for calculating the parameters of our statistical model. If there is not sufficient data, then the estimation window is adjusted to the maximum calendar days from the starting date of the data collected to the last trading day adjacent to the event window's lower boundary. More information regarding the selection of estimation and event windows is provided in Chapter 4.

The table below is a summary of the events under consideration and the data period and frequency.

Company – Market	Data (Frequency)	Data Analysis Period
Event 1 – Deepwater Horizon accident in the Gulf of Mexico		
BP Plc	Daily Adjusted Close Stock Price	01/01/2010 – 31/12/2010
NYSE market Index	Daily market Index	01/01/2010 – 31/12/2010
Event 2 – Exxon Mobil Oil Spill		
Exxon	Daily Adjusted Close Stock Price	01/01/1988 – 31/12/1989
NYSE Market Index	Daily market Index	01/01/1988 – 31/12/1989
Event 3 - HSBC Money Laundry Scandal		
HSBC	Daily Adjusted Close Stock Price	01/01/2012 – 31/12/2013
FTSE 100 Index - London Stock Exchange	Daily market Index	01/01/2012 – 31/12/2013
Event 4 - Libor Scandal		
Barclays	Daily Adjusted Close Stock Price	01/01/2012 – 31/12/2012
RBS	Daily Adjusted Close Stock Price	01/01/2012 – 31/12/2013
FTSE 100 Index - London Stock Exchange	Daily market Index	01/01/2012 – 31/12/2013
UBS AG	Daily Adjusted Close Stock Price	01/01/2012 – 31/12/2013
New York Stock Exchange (NYSE)	Daily market Index	01/01/2012 – 31/12/2013
Event 5 – Google and North Korea Conflict		
Google Inc.	Daily Adjusted Close Stock Price	01/01/2009 - 31/12/2014
NASDAQ Stock Exchange	Daily market Index	01/01/2009 – 31/12/2014

Table 1: List of CSR events pre-qualified for this project

Typically the "estimation window" and the "event window" do not overlap (figure 2). Such a design provides estimators for the parameters of the normal return model that are not influenced by the returns around the event. This ensures that the event impact is captured by the abnormal returns. It is customary to define the event window to be larger than the specific period of interest. This permits examination of periods surrounding the event, thereby capturing possible effects of insider trading (before the announcement of the event) and the longer term effects of the event (MacKinlay, 1997). Brown and Warner (1980) noted that the power of an event study is dependent upon the researcher's ability to define an optimally sized event window, which involves the precise identification of the event date.

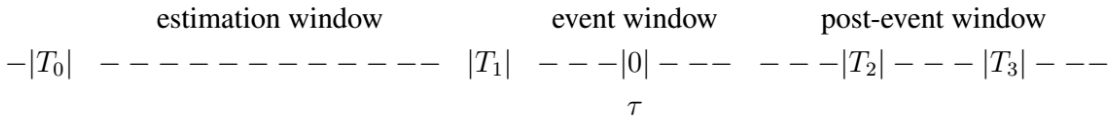


Figure 2. Time Frame Windows for an Event Study

3.4 Sample Selection

In this project, the stock price and stock market index are the main data resources. The data was obtained from DataStream. The event study methodology is based on daily returns $R_{i,(t)}$ calculated using the adjusted closing price for the individual stocks and market indices. Adjusted closing price[1] , is a stock's closing price on any given day of trading that has been amended to include any distributions and corporate actions that occurred at any time prior to the next day's open. The adjusted closing price is often used when examining historical returns or performing a detailed analysis on historical returns.

For calculating the daily continuously compounded logarithmic returns the following formula is used:

[1] Read more: Adjusted Closing Price Definition

http://www.investopedia.com/terms/a/adjusted_closing_price.asp#ixzz44D4vPxe4

$$R_{i,(t)} = \ln\left(\frac{P_{i,(t)}}{P_{i,(t-1)}}\right)$$

Where:

$R_{i,(t)}$ = Realized return on the stock of company i at time t

$P_{i,(t)}$ = Stock Price on day t of company i

$P_{i,(t-1)}$ = Stock Price on previous day for the company i

The natural logarithm was selected for the following reasons and symmetry:

Log-normality: Assuming that prices are distributed log normally, then $\log(1 + r_i)$ is conveniently normally distributed, because:

$$1 + r_i = \frac{p_i}{p_j} = exp^{\log\left(\frac{p_i}{p_j}\right)}$$

A*pproximate raw-log equality*: when returns are very small (common for trades with short holding durations), the following approximation ensures they are close in value to raw returns:

$$\log(1 + r) \approx r, r \ll 1$$

Time-additivity: Consider an ordered sequence of n trades. A statistic frequently calculated from this sequence is the compounding return, which is the running return of this sequence of trades over time:

$$(1 + r_1)(1 + r_2) \ldots . (1 + r_n) = \prod_i (1 + r_i)$$

This formula is fairly unpleasant, as probability theory reminds us that the product of normally-distributed variables is not normal. Instead, the sum of normally-distributed variables is normal (important technicality: only when all variables are uncorrelated), which is useful when we recall the following logarithmic identity:

$$\log(1 + r_i) = \log\left(\frac{p_i}{p_j}\right) = \log(p_i) - \log(p_j)$$

Thus, the compound return over n periods is merely the difference in log between initial and final periods. In terms of algorithmic complexity, this simplification reduces O(n) multiplications to O(1) additions. This is a huge win for moderate to large n. Further, this sum is useful for cases in which returns diverge from normal, as the central limit theorem reminds us that the sample average of this sum will converge to normality (presuming finite first and second moments).

Numerical stability: Addition of small numbers is numerically safe, while multiplying small numbers is not as it is subject to arithmetic underflow. For many interesting problems, this is a serious potential problem. To solve this, either the algorithm must be modified to be numerically robust or it can be transformed into a numerically safe summation via logs.

3.5 The Market Model

A popular and widely used model for calculating the "normal" or "expected" return is the market model and therefore is selected for the purposes of this project. The market model, is a statistical model which relates the return of any given security to the return of the market portfolio. The model's linear specification follows from the assumed joint normality of asset returns (MacKinlay, 1997). The model assumes that the returns are 'jointly multivariate normal', independent and equally distributed over time (Brown and Warner, 1980 and 1985 and MacKinlay, 1997). Brown and Warner (1985) explain that the normality assumption is important for the "exact finite sample results to hold. Without assuming normality, all results would be asymptotic". The market model is described in a wide range of literature, cited in more or less all of the thesis references.

According to the specification of the market model, the return ($R_{i(t)}$) of security *i* at time *t,* is given by the following equation:

$$R_{i(t)} = \hat{a_i} + \hat{\beta_i} R_{m(t)} + \varepsilon_{i(t)}$$

where: $R_{m(t)}$ is the return on the market, $\hat{\beta_i}$ is a coefficient that measures the sensitivity of security's *i* returns to the market, $\hat{a_i}$ represents the expected return on security *i* that is independent of the market and $\varepsilon_{i(t)}$ is a random error term.

3.6 Robustness Checks

A. White-test for heteroscedasticity

Heteroscedasticity may bias the results in the event study. When using the ordinary least squares technique, one of the assumptions is that the error term has a constant variance. However, with time series data, the error terms often have non-constant variance. Heteroscedasticity can lead to underestimation of the variance of the coefficients and, thus, their standard errors. With heteroscedastic data, the OLS estimator is unbiased and consistent but it is not the best linear unbiased estimator (BLUE) of the Gauss-Markov theorem[2]. It can still describe the relationship between the variables well, but cannot reliably estimate the statistical significance of the relationship. The use of the log of the returns' data lessens heteroscedasticity. As a robustness check, the White test is used to detect heteroscedasticity by calculating White's Heteroscedasticity Consistent Standard Errors.

B. Durbin-Watson statistic to measure autocorrelation

The Ordinary Least Squares (OLS) regression analysis uses time series data and it is assumed that the error terms are uncorrelated. Nevertheless, again, it is common that with time series data, autocorrelation of error terms exists and can bias the results. Autocorrelation refers to the correlation of a time series with its own past and future values. This would imply that a time series is predictable. The problem arises, when the disturbance terms are auto correlated. Since standard regression model includes the assumption of independent disturbance terms between observations this could lead to biased results. Positive autocorrelation, for example, would lead to underestimation of the standard errors and the t-values will be biased upwards. The variance of the error term would also be underestimated so that the R square of the regression will be exaggerated. Therefore, the Durbin-Watson statistic will be utilized to test for

[2] Gauss–Markov theorem, states that in a linear regression model in which the errors have expectation zero and are uncorrelated and have equal variances, the best linear unbiased estimator (BLUE) of the coefficients is given by the ordinary least squares (OLS) estimator. Here "best" means giving the lowest variance of the estimate, as compared to other unbiased, linear estimators.

autocorrelation. Typically, the tabulated bounds for the critical values of DW-statistic are used to test the hypothesis of zero autocorrelation against the alternative of positive first-order autocorrelation, since positive autocorrelation is much more common than negative autocorrelation.

The value of Durbin-Watson statistic always lies between 0 and 4. If the DW-statistic is substantially less than 2, there is evidence of positive serial correlation. However, if Durbin–Watson is less than 1.0, there may be cause for alarm, because small values of DW-statistic indicate successive error terms are close in value to one another, or positively correlated. Correspondingly, if the DW-statistic is greater than 2, successive error terms are much different in value to one another, which implies that they are negatively correlated. In regressions with time series data this can imply an underestimation of the level of statistical significance. (Stamatis, 2012)

3.7 Measure abnormal returns in the event window

The estimates of the intercept (alpha) and slope (beta) parameters for each stock will be determined using the ordinary least squares (OLS) within the "estimation period", based on the market model discussed in the previous section. Then, they will be used to determine daily abnormal returns (AR_{it}) for the event window.

$$AR_{it} = R_{it} - \hat{a}_i - \hat{\beta}_i R_{mt}$$

Where:

AR_{it}= The abnormal returns of the stock of company i at time t

R_{it} = Realized return on the stock of company i at time t

R_{mt} = The market index of the stock market where company i is registered

$\hat{a}_i$= the intercept estimate, which measures the average stock return in a period with zero market return

$\hat{\beta}_i$ = the estimated regression coefficient, which measures market risk sensitivity.

3.8 Aggregate Abnormal returns

The abnormal return observations must be aggregated in order to "draw overall inferences for the event of interest" (MacKinlay, 1997). The aggregation can be done along two dimensions; through time and across securities, the order of which is interchangeable. The formulas presented below apply the aggregation first through time and then across stocks.

The aggregated (cumulative) abnormal returns of stock i, CAR, follow the equation:

$$\mathrm{CAR}_i(\mathrm{T}_1, \mathrm{T}_2) = \sum_{\mathrm{t}=\mathrm{T}_1}^{\mathrm{T}_2} \mathrm{AR}_{\mathrm{it}}$$

where

$\mathrm{AR}_{\mathrm{it}}$ = the abnormal return of stock i at time t

and

$\mathrm{CAR}_{\mathrm{i}}(\mathrm{T}_1, \mathrm{T}_2)$ = the sum of the abnormal returns within the defined period from T1 to T2

Then, the cumulative average abnormal returns (CAAR) of all the stocks is equal to:

$$\mathrm{CAAR} = \frac{1}{N} \sum_{\mathrm{i}=1}^{N} \mathrm{CAR}_{\mathrm{i}}$$

When there is only a single stock involved, only aggregation through time needs to be considered (MacKinlay, 1997). Moreover, if there is only one event under examination with a single event window, after adjusting the calculations described by MacKinlay (1997) to this particular single-stock, single-event case, the cumulative abnormal return over the event window is equal to $\overline{CAR}(t_1,t_2) = \sum_{t=t_1}^{t_2} \widehat{CAR} = \sum_{t=t_1}^{t_2} \widehat{AR}$, which would also be equal to CAAR, that is the cumulative average abnormal returns of the specific sample.

The difference between CAR and CAAR cannot be easily demonstrated in the single-stock, single-event case, but generally, CAR refers to the abnormal performance measured as the sum of each interval's (event's) average abnormal performance (Khotari & Warner, 2006), while CAAR is equal to the cumulative average abnormal returns of all the stocks

(Fu, 2011). Therefore, the first involves aggregation through time while the second involves aggregation across stocks.

Alternatively, when there is one single stock, it is clearer to determine that CAR equals the sum of abnormal returns over a specified period of time (for instance, a trading day), while CAAR is equal to the cumulative average abnormal return over that period. Another familiar term is that of AAR, which is equal to the average abnormal returns of all stocks for a specific time. The difference between AAR and CAAR is that AAR refers to a single day (usually the event day), while CAAR refers to a period (usually the event window). Alternatively, when there is one single stock, it is clearer to determine that CAR equals the sum of abnormal returns over a specified period of time, while AAR is basically equal to AR at a specific time and CAAR is equal to the cumulative average abnormal return over that period. Again, the difference between AAR and CAAR is that AAR refers to a single day (usually the event day), while CAAR refers to a period (usually the event window).

On the other hand, as Fu (2011) explains, in the multiple-stock, multiple-event case, for each stock the individual CAR is calculated, summing the ARs of all events in the specific period. Then the distinct CAR_i values are aggregated for that period. Finally, to compute the cumulative average abnormal returns (CAAR) of all stocks, the aggregated CARs are divided by the number of stocks, applying the formulas mentioned earlier. This value of CAAR refers to a sample of companies, as opposed to $\overline{CAAR}$ which refers to the cumulative average abnormal returns of all companies.

This thesis will make use of all the aforementioned measures. Since most of the scenarios are single-stock, single-event, in these cases, AR and AAR are identical for each trading day of the event window, while CAR and CAAR are identical for the entire period of the event window. Therefore, the first step is to calculate the abnormal returns of the stock for each trading day (AR_t), as well as the cumulative abnormal returns for the entire period (CAR). In the multiple-stock, multiple-event case, the differences of the various calculations become more easily apparent. In detail, ARs are calculated for each stock and each trading day ($AR_{i,t}$). Then, the average abnormal returns are calculated for each trading day (AAR_t). On the other hand, cumulative abnormal returns are calculated for each stock and for the entire event window (CAR_i), while cumulative average abnormal

returns (CAAR) are calculated to achieve aggregation both across time and stocks. As explained in the following sections, all these calculations are used to perform statistical analysis and examine whether the generated abnormal returns are statistically different from 0.

3.9 Hypothesis Analysis

As already mentioned, the goal of this paper is to determine the relationship (if any) between corporate social responsibility and the movement of stock prices. Recent literature argues that firms pursue profit maximizing CSR (e.g., Bénabou and Tirole, 2010; Gillan et al., 2010; Fatami et al., 2009). According to their findings, socially responsible firms have a competitive disadvantage because they incur costs that fall directly upon the bottom line and reduce profits; these costs should be avoided. On the other hand, many empirical studies reveal no significant relationship between CSR and financial performance. Ullman (1985) refers to multiple factors affecting the possible relationships among economic performance, social disclosures and social performance, and develops a three dimensional framework including stakeholder power, strategic posture and economic performance as reasons to engage in socially responsible activities. The third view proposes a positive relationship, since the actual costs of CSR are covered by the benefits. For example, Fatemi and Fooladi (2013) argue that, compared to other firms, those that engage in CSR activities enjoy competitive advantages and therefore enhanced market values. Servaes and Tamayo (2013) show that CSR and firm value are positively related for firms with high customer awareness. Dimson et al. (2015) find that firms are more likely to undertake CSR and CSR is more likely to be value enhancing if the firm is concerned about its reputation and if it has higher capacity to implement changes. El Ghoul et al. (2011) find that firms with better CSR scores exhibit cheaper equity financing (i.e. higher value), while Goss and Roberts (2011) find that more socially responsible firms pay between 7 and 18 basis points on overall cost of capital less than firms with social responsibility concerns.

The present study is investigating different CSR events using the event study technique attempting to contribute to the aforementioned literature by identifying the direction of the relationship (if any) between these variables.

3.10 Statistical Analysis of abnormal returns

The final step in the event study is to analyze whether the estimated abnormal returns due to the event are statistically significant. The hypotheses under examination are:

H_0: The event has no impact on the stock returns

H_1: The event has an impact on the stock returns

For hypothesis testing, there are several different tests to choose from, all providing benefits as well as disadvantages in the form of correctness and accuracy. Which one to choose depends on the characteristics of the study and data sample.

According to MacKinlay (1997), under the null hypothesis H_0 that the event has no impact on the behavior of market returns, the abnormal returns are normally distributed with zero conditional mean and conditional variance equal to $\sigma^2(AR_{it}) = \sigma_{\varepsilon_i}^2 + \frac{1}{L_1}\left[1 + \frac{(R_{m,t} - \widehat{\mu_m})}{\widehat{\sigma_\mu^2}}\right]$, where L_1 is the estimation window. It is assumed that, when the estimation window is sufficiently large, the contribution of the second component to the variance of the abnormal return is zero, therefore $\sigma^2(AR_{it}) \approx \hat{\sigma}_{\varepsilon_i}^2$.

Given the null hypothesis that the event has no impact on the returns of the share price, the distribution of the sample AR over the event window is $AR_{it} \approx N\big(0, \sigma^2(AR_{it})\big)$. The observed abnormal returns are then aggregated along two dimensions, through time and across stocks, as mentioned earlier.

The calculations involved in the single-stock, single-event case apply the formulas $CAR = \sum_{t=t_1}^{t_2} AR_t$ and $CAAR = \frac{1}{N}\sum_{i=1}^{N} CAR_i$, where i is the number of events, or in this case intervals within the event window, assuming that each interval is one-day long. This way, CAAR would demonstrate the evolution of CAR over time, and the null hypothesis would require that H_0: $\overline{CAAR} = 0$ versus H_1: $\overline{CAAR} \neq 0$, where $\overline{CAAR}$ would refer to the CAAR of the entire event window.

To test the statistical significance of the results a one-sample two-tailed t-test is performed on CAAR, (Muller, 2015), which is used since $\overline{CAAR}$ is tested against the zero value, therefore we equally want to test against $\overline{CAAR} > 0$ and $\overline{CAAR} < 0$. If the absolute value of the observed t is less than the two-tailed critical t, then H0 cannot be rejected, implying no statistical significance (Fu, 2011).

Similarly, the statistical test performed later in a multiple-stock, multiple-event case is the t-test with the formula (Muller, 2015):

$$t = \sqrt{N}\frac{CAAR}{s}$$

where $s = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(CAR_i - CAAR)^2}$

The calculated t-value is then compared to the critical t-value, found in related tables (double side, with $a = 0.05$ and $df = N - 1$). If $|t| < t_{crit}$, the null hypothesis is rejected.

Alternatively, instead of testing the statistical significance of the cumulative average abnormal return, a parametric t-test may be used to test the statistical significance of the average abnormal returns, so as to assess the validity of the hypothesis. Zevenbergen (2008) describes the steps performed as well as the prerequisites regarding the test, according to which the abnormal returns must be independent, identically and normally distributed. Then, the following formula is used to calculate the t-value for each AAR_t corresponding to each trading day :

$$t = \frac{AAR_t}{s}$$

where $s = \sqrt{\frac{1}{t_2 - t_1}\sum_{t_1}^{t_2}(AAR_t - \overline{AAR})^2}$ and

AAR_t = the average abnormal return on day t,

$\overline{AAR}$ = the average abnormal return over the whole period, equal to :

$$\overline{AAR} = \frac{1}{t_2 - t_1 + 1} \cdot \sum_{t=t_1}^{t_2} AAR_t \ ,$$

$t_2 - t_1$ = the amount of days included in the period

Again, the calculated each t-value is then compared to the critical t-value, found in related tables (double side, with $a = 0.05$ and $df = t_2 - t_1$). If $|t| < t_{crit}$, the null hypothesis H_0: $AAR_t = 0$ will be rejected.

Therefore, in this thesis, several types of tests will be performed for each case :

- First, the average abnormal return on each day of the event window will be assessed for its statistical significance, to investigate whether the average daily abnormal returns within the event window are statistically different from 0.
- In the single-event, single-stock cases, another t-test will be performed on the mean of time-series average abnormal returns for the period between the actual event date and the end of the event window.
- Then, a t-test will be performed on the cumulative average abnormal return of the entire event window, in order to examine the statistical significance of the impact aggregated both across time and across stocks (when available).
- Finally, the evolution of CAAR across the event window will be examined and tested to assess whether the impact of each CSR event is statistically significant.

Chapter 4
Events Study

4.1 General Assumptions

As already mentioned in the Methodology chapter, the first steps of the event study was to collect the historical data from DataStream, and define the estimation, event and post-event windows. There is no specific rule and different studies have proposed a variety of window lengths. MacKinlay (1997) states that the windows should not overlap in order to prevent the event from being affected by noise and other independent events occurring during the estimation window, while the estimators of the parameters of the normal return model are not influenced by the returns around the event. He suggests an event window expanding from [-1, +1] to multiple days before and after the announcement of the event and an estimation window of over 120 days prior to the event. In fact, in his example of an event study, he selected a 41-day ([-20,+20]) event window and a 250-day estimation window. Fu (2011) has used a 730-day estimation period and a 61-day event window with a 180-day interval between them. Tronsgaard & Berger (2014) have selected a 7-day event window and an estimation window of 250 trading days.

This study uses an event window of 120 calendar days and an estimation window of maximum 120 calendar days, which do not overlap. When the boundaries do not coincide with trading days, they are carried forward to the next trading day available. The post-event window is not analyzed, as the study is mainly focused on the immediate reaction to the event, while the post-event window may be exposed to other events and noise. The selected lengths apply to all events under examination.

4.2 Deepwater Horizon accident in the Gulf of Mexico

The first event refers to the oil spill after the explosion and sinking of the Deepwater Horizon oil rig in the Gulf of Mexico on the BP-operated Macondo Prospect, on 20 April 2010. The largest accidental marine oil spill in the history of the petroleum industry lasted almost three months, causing eleven people to go missing and never been found, and a massive environmental disaster.

In this particular event, where the event and its announcement both occurred on the 20th of April, 2010, the estimation window expands from 01/01/2010 to 19/02/2010 and the event window involves the trading days between 22/02/2010 and 21/06/2010.

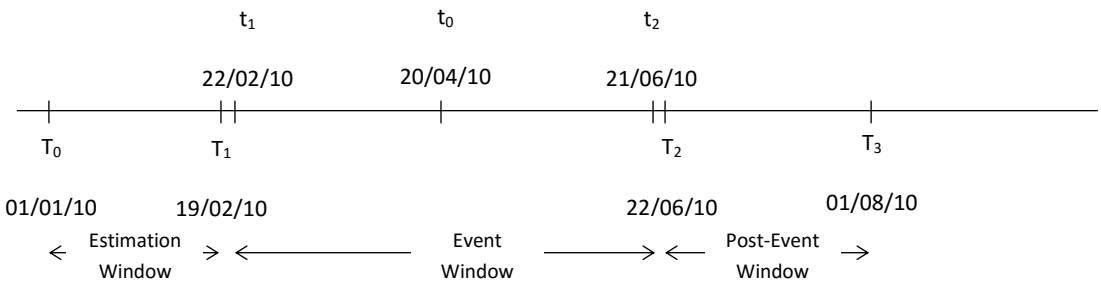


Figure 3. Time Frame Windows for Deepwater Horizon

All calculations have been performed with the use of SPSS. Their results are summarized below and are fully available in Appendix A.

After gathering the historical data on both the share price of BP Plc and the stock market index (NYSE) and importing them in SPSS, the first step was to calculate the daily continuously compounded returns of each, thus transforming them into two new variables, R_i and R_m, respectively. The new variables were computed using the following formulas in SPSS:

$$Ri = \ln(BPPlc/lag(BPPlc, 1))$$

$$Rm = \ln(NYSECOMPOSITE/lag(NYSECOMPOSITE, 1))$$

where lag (variable, 1) refers to the value of the variable in the previous case, or in other words, trading day.

An auxiliary variable *event_id* was also created, to be used later for filtering the necessary cases in SPSS, when specific periods of time were examined, regarding the estimation and

event windows. It basically refers to each case or distinct trading day. That way, since the estimation window has a span of 36 trading days, it lies between cases for which event_id<=36, while for the event window event_id>=37 & event_id <= 122.

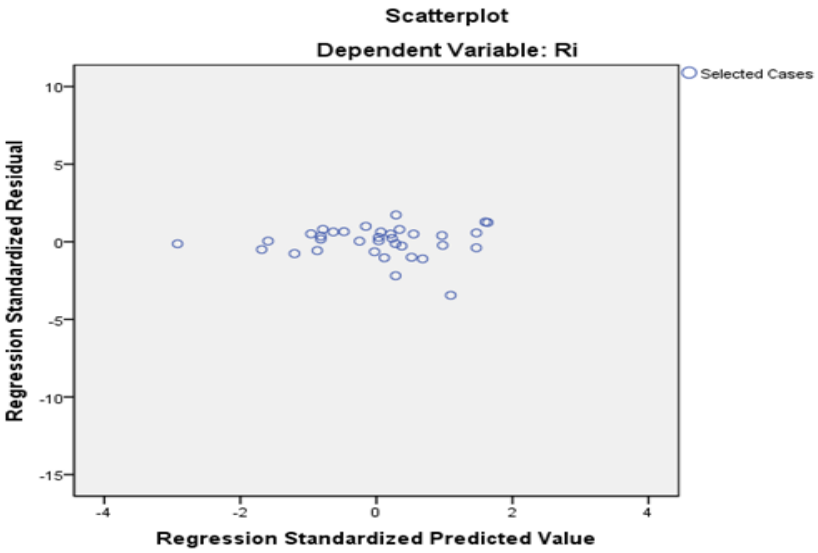
Linear regression was applied to estimate the parameters $\widehat{\alpha_i}$ and $\widehat{\beta_i}$ of the market model $R_{i,t} = \widehat{\alpha_i} + \widehat{\beta_i} R_{m,t} + \varepsilon_{i,t}$, using the data from the estimation window, for which event_id was less or equal to 36.

The entire results of the linear regression are available in Appendix A, however, the estimated values of parameters $\widehat{\boldsymbol{\alpha_i}}$ and $\widehat{\boldsymbol{\beta_i}}$ were **-0.001** and **0.373** respectively.

Two robustness checks were performed to the market regression model applied earlier to calculate the expected daily returns.

The first Durbin-Watson's test for autocorrelation. Its results are included in the detailed regression results presented in Appendix A, according to which, the DW statistic is equal to 2,429, which exceeds the DW bounds (1.205, 1.315) for the specified sample size and number of regressors (k=1, n=36). Therefore, the null hypothesis that the residuals from an OLS regression are not auto correlated is not rejected. In other words, there was no autocorrelation in the model examined.

The second robustness test would involve a test for heteroscedasticity, such as White-test. SPSS does not offer such a test. However, the scatterplot of standardized residuals versus standardized predicted values below may be helpful in detecting any issue of heteroscedasticity, or lack of homoscedasticity, that is the non-constant variance of the residuals across levels of the predicted values. The scatterplot below indicates that the model may suffer from heteroscedasticity, as the pattern of the data points is narrower at the left end.



Then, under the condition requiring all cases within the event window

Date >= DATE.DMY(2010,2,22) & Date <= DATE.DMY(2010,6,21)

or equally,

event_id>=37 & event_id <= 122

the daily expected return of the share price in the event period was computed via the formula

$$Rexp = -0.001 + 0.373 * Rm$$

The daily abnormal returns for the same period were calculated by subtracting the expected daily returns from the actually observed values

$$AR = Ri - Rexp$$

The results of the calculations are available in Appendix B.

Since this event falls into the category of single-stock, single-event cases described in Sections 3.8 and 3.10, the cumulative average abnormal return over the event window is equal to the cumulative abnormal returns over the same period, that is the sum of abnormal returns of each trading day, also equal to the sum of average abnormal returns of each trading day. The following equation summarizes the above relationships : $CAAR(t_1,t_2) = \sum_{t=t_1}^{t_2} AAR_t = CAR(t_1,t_2) = \sum_{t=t_1}^{t_2} AR_t = -0.417228$. In other words,

during the period of the event window, the average abnormal returns have been reduced by approximately 42%, which approximates the roughly 39%[3] decrease in the stock's actual price, during the same period. So far, it has been demonstrated that the stock price of BP has suffered a substantial decline across the event window. The next step is to investigate whether this loss is related to the event, or to other factors. Therefore, a series of calculations and statistical tests should be performed to assess whether there is a statistically significant relationship between the CSR event and the stock price decrease, as already instructed in Section 3.10. Both SPSS and Excel were used for these calculations, to obtain the best results in the fastest and most efficient manner.

The first step was to calculate the average abnormal returns for each trading day, which were equal to the abnormal returns computed earlier, since there is only one stock and one event. Then, the t-value was calculated for each AAR_t, so as to investigate whether each daily average abnormal return was statistically different from 0. To do so, each t-value was compared to the two-tailed critical ($a = 0.05$ and $df = 85$), available from the table of critical t values, which in this case was equal to 1.988.

It appears that neither on the actual event date nor on most trading days of the entire event window were the average abnormal returns significantly different from 0. In fact, on the date of the event (20/04/2010, event_id=78), the AAR were equal to 0.017334 with a t-value of 0.605<1.988, which implied no statistically significant abnormal returns, while there were no statistically significant values prior to the event date, and only a handful of trading days when the abnormal returns were significantly different from 0, mostly at the end of the event window. These results are marked in the following table.
Consequently, the first statistical test did not provide enough information to support that the CSR event had a statistically significant impact on the company's share performance.
The next step was to test whether the CAAR over the entire event window, which was previously found equal to -0.417228, was statistically significant. To do so, the t-value of CAAR was calculated and found equal to -1.571071. Thus, its absolute value was less than the critical value (1.988), which implied that the overall CAAR was not proven statistically

[3] The average change in the actual stock price over the period of the event window is equal to [BPPlc(t_2)- BPPlc(t_1)]/ BPPlc(t_1), where t_1 is the first trading day and t_2 the last trading day of the event window.

significant. The results of the aforementioned calculations are summarized in the table below.

event_id	Date	AR_t	AAR_t	$(AAR_t - \overline{AAR})^2$	t-value (AAR_t)
37	22-Feb-10	0.001077	0.001077	0.000035	0.037609
38	23-Feb-10	-	-0.007867	0.000009	-0.274714
39	24-Feb-10	0.003931	0.003931	0.000077	0.137270
40	25-Feb-10	-	-0.013649	0.000077	-0.476620
41	26-Feb-10	0.019573	0.019573	0.000597	0.683485
42	1-Mar-10	0.026989	0.026989	0.001014	0.942450
43	2-Mar-10	0.006177	0.006177	0.000122	0.215699
44	3-Mar-10	0.005980	0.005980	0.000117	0.208820
45	4-Mar-10	0.004857	0.004857	0.000094	0.169605
46	5-Mar-10	0.003599	0.003599	0.000071	0.125676
47	8-Mar-10	0.007777	0.007777	0.000159	0.271571
48	9-Mar-10	0.006426	0.006426	0.000127	0.224394
49	10-Mar-	0.007801	0.007801	0.000160	0.272409
50	11-Mar-	-	-0.002221	0.000007	-0.077557
51	12-Mar-	-	-0.005598	0.000001	-0.195481
52	15-Mar-	0.000634	0.000634	0.000030	0.022139
53	16-Mar-	0.002170	0.002170	0.000049	0.075776
54	17-Mar-	0.011873	0.011873	0.000280	0.414603
55	18-Mar-	0.006168	0.006168	0.000121	0.215385
56	19-Mar-	0.007165	0.007165	0.000144	0.250200
57	22-Mar-	-	-0.009001	0.000017	-0.314313
58	23-Mar-	0.005601	0.005601	0.000109	0.195586
59	24-Mar-	0.008627	0.008627	0.000182	0.301253
60	25-Mar-	-	-0.001321	0.000012	-0.046129
61	26-Mar-	-	-0.005276	0.000000	-0.184237
62	29-Mar-	-	-0.007474	0.000007	-0.260990
63	30-Mar-	-	-0.005499	0.000000	-0.192024
64	31-Mar-	0.000684	0.000684	0.000031	0.023885
65	1-Apr-10	0.009052	0.009052	0.000193	0.316094
66	2-Apr-10	0.001000	0.001000	0.000034	0.034920
67	5-Apr-10	-	-0.002051	0.000008	-0.071620
68	6-Apr-10	0.024310	0.024310	0.000850	0.848900
69	7-Apr-10	-	-0.002340	0.000006	-0.081712
70	8-Apr-10	-	-0.008074	0.000010	-0.281942
71	9-Apr-10	0.004130	0.004130	0.000081	0.144219
72	12-Apr-10	0.000380	0.000380	0.000027	0.013270
73	13-Apr-10	0.000542	0.000542	0.000029	0.018927
74	14-Apr-10	0.000340	0.000340	0.000027	0.011873
75	15-Apr-10	0.016726	0.016726	0.000466	0.584068
76	16-Apr-10	-	-0.009718	0.000024	-0.339350
77	19-Apr-10	0.001503	0.001503	0.000040	0.052484
78	**20-Apr-**	**0.017334**	**0.017334**	**0.000492**	**0.605299**
79	21-Apr-10	-	-0.008856	0.000016	-0.309250
80	22-Apr-10	-	-0.017282	0.000155	-0.603484
81	23-Apr-10	0.003314	0.003314	0.000067	0.115724
82	26-Apr-10	-	-0.018210	0.000178	-0.635889
83	27-Apr-10	-	-0.015596	0.000115	-0.544609
84	28-Apr-10	0.023466	0.023466	0.000802	0.819428
85	29-Apr-10	-	-0.070937	0.004367	-2.477104
86	30-Apr-10	-	-0.008314	0.000012	-0.290323
87	3-May-10	-	-0.002414	0.000006	-0.084296
88	4-May-10	-	-0.018663	0.000191	-0.651708
89	5-May-10	0.016623	0.016623	0.000461	0.580471

90	6-May-10	0.017398	0.017398	0.000495	0.607534
91	7-May-10	-	-0.017247	0.000154	-0.602261
92	10-May-	-	-0.025496	0.000426	-0.890315
93	11-May-	-	-0.003907	0.000001	-0.136432
94	12-May-	-	-0.011035	0.000038	-0.385340
95	13-May-	0.016221	0.016221	0.000444	0.566434
96	14-May-	-	-0.023121	0.000334	-0.807380
97	17-May-	0.001163	0.001163	0.000036	0.040612
98	18-May-	0.014273	0.014273	0.000366	0.498410
99	19-May-	-	-0.017140	0.000151	-0.598525
100	20-May-	0.026138	0.026138	0.000960	0.912733
101	21-May-	-	-0.048494	0.001905	-1.693400
102	24-May-	-	-0.020377	0.000241	-0.711560
103	25-May-	-	-0.014897	0.000101	-0.520200
104	26-May-	0.016851	0.016851	0.000471	0.588433
105	27-May-	0.043438	0.043438	0.002332	1.516845
106	28-May-	-	-0.044667	0.001585	-1.559762
107	31-May-	0.001000	0.001000	0.000034	0.034920
108	1-Jun-10	-	-0.132133	0.016201	-4.614055
109	2-Jun-10	-	-0.009446	0.000021	-0.329852
110	3-Jun-10	0.005669	0.005669	0.000111	0.197960
111	4-Jun-10	0.017959	0.017959	0.000520	0.627124
112	7-Jun-10	-	-0.001065	0.000014	-0.037190
113	8-Jun-10	-	-0.054775	0.002492	-1.912731
114	9-Jun-10	-	-0.040293	0.001256	-1.407023
115	10-Jun-10	-	-0.080360	0.005702	-2.806153
116	11-Jun-10	0.069026	0.069026	0.005458	2.410373
117	14-Jun-10	-	-0.096798	0.008454	-3.380165
118	15-Jun-10	-	-0.046862	0.001765	-1.636411
119	16-Jun-10	-	-0.012991	0.000066	-0.453643
120	17-Jun-10	0.065869	0.065869	0.005001	2.300131
121	18-Jun-10	-	-0.005606	0.000001	-0.195760
122	21-Jun-10	-	-0.020991	0.000260	-0.733001

s	**0.028637**	
CAAR(t_1,t_2)	-0.417228	
$t_{(CAAR)}$	-1.571071	
$\lvert t_{(CAAR)} \rvert$	1.571071	< 1.988

Moreover, a t-test on the time series mean abnormal returns was performed using the AAR observations during the period between the event date and the end of the event window, with the following results :

Count	45	
Average	-0.01183	
St.Deviation	0.037559	
St.Error	0.005599	
t-statistic	-2.11243	
|t-stat|	2.11243	>2.014 = t-critical

The particular t-test, which focuses on the mean abnormal returns after the occurrence of the event, shows statistically significant results.

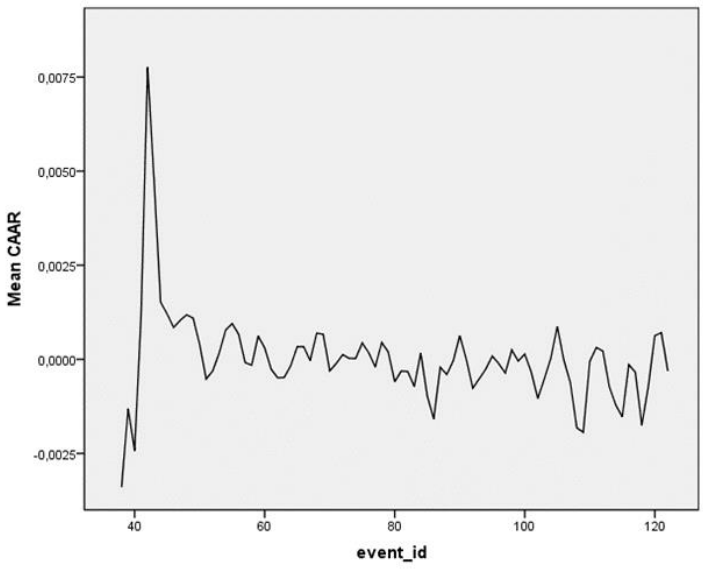
Finally, to assess the evolution of CAR across the event window, in SPSS, we apply the formulas $CAR = \sum_{t=t_1}^{t_2} AR_t$ and $CAAR = \frac{1}{N}\sum_{i=1}^{N} CAR_i$, discussed in Chapter 3. Therefore, for each day CAR would be equal to the cumulative AR and CAAR would be equal to the average CAR up to that point:

$$CAR = AR + lag(AR, 1)$$

$$CAAR = CAR/(event\_id - 37 + 1)$$

where $(event\_id - 37 + 1)$ is the number of days counting from the first day of the event window.

This way, the null hypothesis would require that H_0: $\overline{CAAR} = 0$ versus H_1: $\overline{CAAR} \neq 0$, where $\overline{CAAR}$ would refer to the CAAR of the entire event window.
As shows the plot below, a spike may be observed early on, which may be attributed to a higher increase in the share's returns. From that point on, mean $CAAR$ fluctuates around 0 across the event window, approximating zero value on the day of event (20/04/2010, event_id=78).



We then perform a one-sample t-test on CAAR (Muller, 2015), with the following results:

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
CAAR	85	,000016	,0012999	,0001410

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
CAAR	,116	84	,908	,0000163	-,000264	,000297

SPSS offers the two-tailed significance (the 2-tailed p value), which is used since $\overline{CAAR}$ is tested against the zero value, therefore we equally want to test against $\overline{CAAR} > 0$ and $\overline{CAAR} < 0$

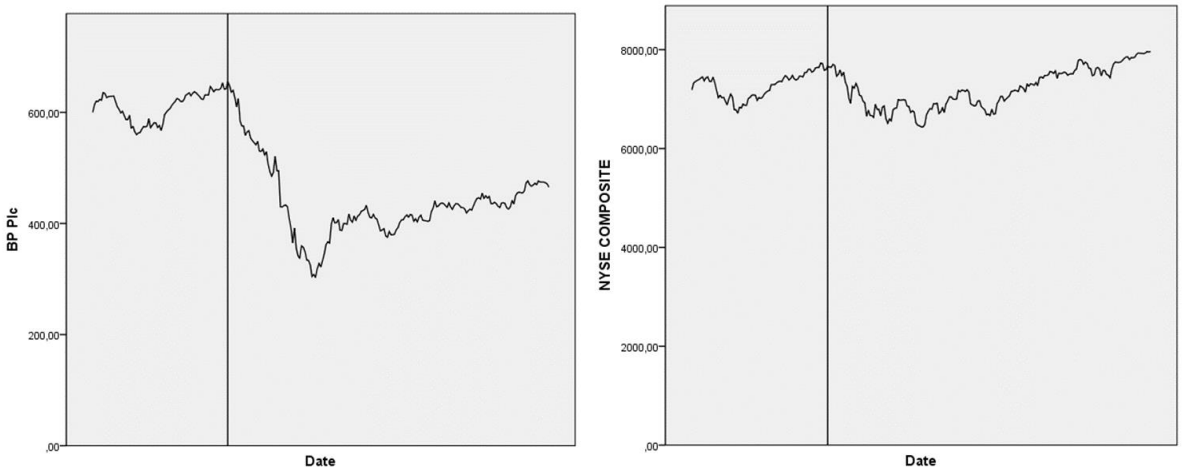
If the absolute value of the observed t is less than the two-tailed critical t, then H_0 cannot be rejected, implying no statistical significance. (Fu, 2011) Therefore, in this case, where the critical t is 1.989 (available from the table of critical t values) and the observed t is 0.116, we fail to reject H_0, which means that there is insufficient evidence to conclude that the mean CAAR is different than zero. Subsequently, it cannot be inferred that the CSR event has a statistically significant impact on the value of BP' share price. At this point, it should be stressed that the fact that a relationship between the CSR event and BP's stock performance cannot be statistically proved, does not mean that it does not exist. It practically implies that either there was no sufficient evidence to support this hypothesis, or that other external factors influenced the share price more strongly than the CSR event.

Conclusions

The event study performed on this event has demonstrated that the CSR event involving the explosion and sinking of the Deepwater Horizon oil rig on 20 April 2010 and the generated oil spill, does not appear to have imposed a statistically significant impact on the company's share price in the event window. Except for the t-test performed on the time-series mean abnormal returns over the period after the event date, all three other

methods used to evaluate the impact of CSR event led to the same conclusions, that there was not enough statistical evidence to reject the null hypothesis.

The historical data show a gradual decrease of BP's share price across time, its evolution however is generally parallel to that of the market index, leading to the assumption that the company's stock performance fluctuations may not be influenced by this particular event as much as by the overall financial and economic environment of that period. The following graphs demonstrate the trend of both BP's share price and NYSE index. The vertical line refers to the date of the event. It can be easily noticed that the company's share price generally follows the trend of the market's performance across time, only with a sharper fall for a period covering mostly the second half of the event window and a part of the post-event window, which matches the results of the third test. The inconsistencty of the results among the statistical tests, could be attributed to the inadequacy of the provided data, since the estimation window in this case was fairly narrow, probably generating false results in the calculation of the market model parameters which were used to estimate the expected daily returns and calculate the abnormal returns in the event window.



4.3 Exxon Mobil Oil Spill

The second event involves the oil spill that followed that tragic accident of the Exxon Valdez supertanker running aground in Alaska's Prince William Sound on March 24, 1989. More than 250,000 barrels of oil were lost in a short period of time. This accident has been one of the worst situations faced in the long history of ExxonMobil, but the company took immediate responsibility for the spill, spending large amounts of money on compensatory payments, cleanup payments, settlements and fines, as well as on operational reforms to prevent future incidents. (ExxonMobil)

In this particular event, the event date is the 24th of March, 1989, therefore the estimation window expands from 25/09/1988 to 23/01/1989, the event window involves the trading days between 24/01/1989 and 24/05/1989.

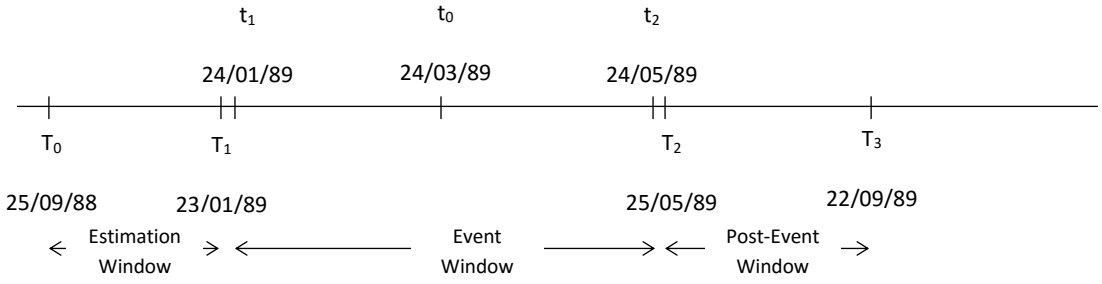


Figure 4. Visual Display of Estimation & Event Window

Again, all calculations have been performed via SPSS. Their results are presented here and are fully available in Appendix A.

The historical data on both the share price of Exxon Mobil and the stock market index (NYSE) was collected and imported in SPSS[4], and since this is once again a single-stock, single-event case, the steps followed are identical to the first event. Therefore, the results are briefly reported without unnecessarily repeating the procedure description in detail.

Consequently, daily continuously compounded returns calculated into ew variables, R_i and R_m, respectively via the following formulas in SPSS:

$$Ri = \ln(EXXONMOBIL/lag(EXXONMOBIL, 1))$$

[4] to facilitate calculations later the data inserted included trading days since the starting date of the estimation window.

$$Rm = \ln(NYSECOMPOSITE/lag(NYSECOMPOSITE, 1))$$

where lag (variable, 1) refers to the value of the variable in the previous trading day.

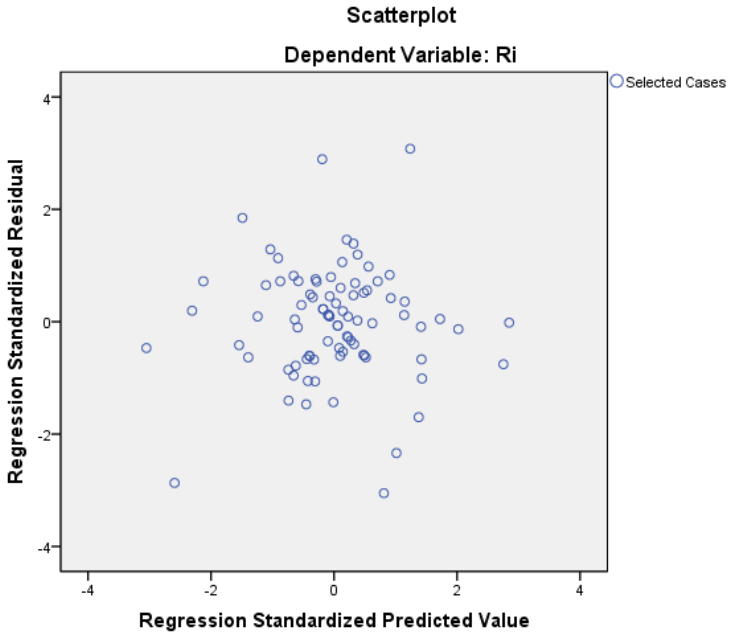
The auxiliary variable *event_id* was created, to be used later for case filtering regarding the estimation and event windows and referring to each case or distinct trading day. The estimation window lies between cases for which event_id <= 87, while for the event window event_id>=88 & event_id <= 174.

Linear regression was applied to estimate the parameters $\widehat{a_i}$ and $\widehat{\beta_i}$ of the market model $R_{i,t} = \widehat{\alpha_i} + \widehat{\beta_i} R_{m,t} + \varepsilon_{i,t}$, using the data from the estimation window, for which event_id <= 87.

The entire results of the linear regression are available in Appendix A, however, the estimated values of parameters $\widehat{\boldsymbol{a_i}}$ and $\widehat{\boldsymbol{\beta_i}}$ were **-0.001** and **1.446** respectively.

Two robustness checks were performed to the market regression model applied earlier to calculate the expected daily returns. The first Durbin-Watson's test for autocorrelation. Its results are included in the detailed regression results presented in Appendix A, according to which, the DW statistic is equal to 2,209, which exceeds the DW bounds (1.496, 1.541) for the specified sample size and number of regressors (k=1, n=87). Therefore, the null hypothesis that the residuals from an OLS regression are not auto correlated is not rejected. In other words, there was no autocorrelation in the model examined.

As explained in the analysis of the previous event, the scatterplot of standardized residuals versus standardized predicted values helps in detecting any issue of heteroscedasticity. In this case, the scatterplot does not show any significant indications of heteroscedasticity.



The following step was to compute the daily expected return of the share price in the event period with the use of the formula

$$Rexp = -0.001 + 1.446 * Rm$$

and under the condition requiring all cases within the event window, that is event_id>=88 & event_id <= 174.

Then, the daily abnormal returns for the same period were calculated by subtracting the expected daily returns from the actually observed values

$$AR = Ri - Rexp$$

The results of the calculations are available in Appendix B.

This event also falls into the category of single-stock, single-event cases described in Sections 3.8 and 3.10, so, the cumulative abnormal return (CAR), as well as CAAR, over the entire event window, is equal to the sum of ARs or **-0.085597**. Therefore, during the period of the event window, the average abnormal returns have been reduced by 8.6%, which is a fairly larger percent than the 3%[5] decrease in the stock's actual price, during

[5] The average change in the actual stock price over the period of the event window is equal to [EXXONMOBIL(t_2)- EXXONMOBIL (t_1)]/ EXXONMOBIL (t_1), where t_1 is the first trading day and t_2 the last trading day of the event window.

the same period. So far, it has been demonstrated that the stock price of EXXONMOBIL has not been significantly changed across the event window. There is a slight decrease, which could be induced by the CSR event, but could also be caused by other factors. Therefore, statistical tests should be performed to assess whether there is a statistically significant relationship between the CSR event and the stock price decrease.

The first step was to calculate the average abnormal returns for each trading day, which were equal to the abnormal returns computed earlier, since there is only one stock and one event. Then, the t-value was calculated for each AAR_t, so as to investigate whether each daily average abnormal return was statistically different from 0. To do so, each t-value was compared to the two-tailed critical ($a = 0.05$ and $df = 86$), available from the table of critical t values, which in this case was equal to 1.988.

It appears that neither on the actual event date nor on most trading days of the entire event window were the average abnormal returns significantly different from 0. In fact, on the date of the event (24/03/1989, event_id=131), the AAR were equal to 0.001 with a t-value of 0.132<1.988, which implied no statistically significant abnormal returns. Within the event window, the values of AAR fluctuated around 0, with only six trading days having statistically significant AAR values.

Consequently, the first statistical test showed that the CSR event did not have a statistically significant impact on the company's share performance.
The next step was to test the significance of the CAAR over the entire event window, which was equal to -0.085597. Its t-value was computed to be -1.209770. Thus, its absolute value was less than the critical value (1.988), which implied that the overall CAAR was not statistically significant. The results of the aforementioned calculations are summarized in the table below.

event_id	Date	AR_t	AAR_t	$(AAR_t - \overline{AAR})^2$	t-value (AAR_t)
88	24-Jan-89	-	-0.005035	0.000016	-0.663748
89	25-Jan-89	-	-0.007347	0.000040	-0.968532
90	26-Jan-89	0.003852	0.003852	0.000023	0.507797
91	27-Jan-89	-	-0.004150	0.000010	-0.547082
92	30-Jan-89	-	-0.001466	0.000000	-0.193258
93	31-Jan-89	-	-0.002269	0.000002	-0.299115
94	1-Feb-89	-	-0.005408	0.000020	-0.712920

95	2-Feb-89	-	-0.000568	0.000000	-0.074878
96	3-Feb-89	0.002306	0.002306	0.000011	0.303993
97	6-Feb-89	-	-0.015619	0.000214	-2.059004
98	7-Feb-89	-	-0.003377	0.000006	-0.445179
99	8-Feb-89	-	-0.004960	0.000016	-0.653861
100	9-Feb-89	0.017168	0.017168	0.000329	2.263204
101	10-Feb-89	0.000874	0.000874	0.000003	0.115217
102	13-Feb-89	0.007820	0.007820	0.000078	1.030886
103	14-Feb-89	-	-0.011512	0.000111	-1.517591
104	15-Feb-89	0.006873	0.006873	0.000062	0.906046
105	16-Feb-89	-	-0.004292	0.000011	-0.565801
106	17-Feb-89	-	-0.009867	0.000079	-1.300736
107	20-Feb-89	0.001000	0.001000	0.000004	0.131827
108	21-Feb-89	-	-0.000979	0.000000	-0.129059
109	22-Feb-89	0.008543	0.008543	0.000091	1.126197
110	23-Feb-89	0.004404	0.004404	0.000029	0.580566
111	24-Feb-89	0.001946	0.001946	0.000009	0.256535
112	27-Feb-89	0.008121	0.008121	0.000083	1.070566
113	28-Feb-89	-	-0.001075	0.000000	-0.141714
114	1-Mar-89	-	-0.000549	0.000000	-0.072373
115	2-Mar-89	0.001613	0.001613	0.000007	0.212637
116	3-Mar-89	-	-0.002379	0.000002	-0.313616
117	6-Mar-89	0.014333	0.014333	0.000235	1.889475
118	7-Mar-89	-	-0.010101	0.000083	-1.331584
119	8-Mar-89	-	-0.003158	0.000005	-0.416309
120	9-Mar-89	0.007133	0.007133	0.000066	0.940321
121	10-Mar-	-	-0.005260	0.000018	-0.693410
122	13-Mar-	-	-0.000999	0.000000	-0.131695
123	14-Mar-	0.004280	0.004280	0.000028	0.564219
124	15-Mar-	0.006059	0.006059	0.000050	0.798739
125	16-Mar-	0.001742	0.001742	0.000007	0.229642
126	17-Mar-	0.008974	0.008974	0.000099	1.183015
127	20-Mar-	0.001114	0.001114	0.000004	0.146855
128	21-Mar-	-	-0.002240	0.000002	-0.295292
129	22-Mar-	0.009814	0.009814	0.000117	1.293749
130	23-Mar-	-	-0.000225	0.000001	-0.029661
131	**24-Mar-**	**0.001000**	**0.001000**	**0.000004**	**0.131827**
132	27-Mar-	-	-0.005033	0.000016	-0.663485
133	28-Mar-	-	-0.012974	0.000144	-1.710322
134	29-Mar-	-	-0.013206	0.000149	-1.740906
135	30-Mar-	-	-0.002894	0.000004	-0.381507
136	31-Mar-	-	-0.001719	0.000001	-0.226610
137	3-Apr-89	-	-0.020661	0.000387	-2.723676
138	4-Apr-89	0.005180	0.005180	0.000038	0.682863
139	5-Apr-89	0.003102	0.003102	0.000017	0.408927
140	6-Apr-89	-	-0.007277	0.000040	-0.959304
141	7-Apr-89	-	-0.012500	0.000133	-1.647836
142	10-Apr-89	-	-0.016589	0.000244	-2.186877
143	11-Apr-89	-	-0.010700	0.000094	-1.410548
144	12-Apr-89	0.007082	0.007082	0.000065	0.933598
145	13-Apr-89	0.009654	0.009654	0.000113	1.272657
146	14-Apr-89	-	-0.019263	0.000334	-2.539382
147	17-Apr-89	0.002485	0.002485	0.000012	0.327590
148	18-Apr-89	0.009563	0.009563	0.000111	1.260661
149	19-Apr-89	0.002644	0.002644	0.000013	0.348550
150	20-Apr-89	0.012611	0.012611	0.000185	1.662469
151	21-Apr-89	0.004727	0.004727	0.000033	0.623146
152	24-Apr-89	0.001745	0.001745	0.000007	0.230038
153	25-Apr-89	-	-0.006000	0.000025	-0.790961
154	26-Apr-89	-	-0.017738	0.000281	-2.338346
155	27-Apr-89	-	-0.007207	0.000039	-0.950077

156	28-Apr-89	-	-0.002364	0.000002	-0.311639
157	1-May-89	-	-0.001988	0.000001	-0.262072
158	2-May-89	-	-0.003659	0.000007	-0.482355
159	3-May-89	0.001167	0.001167	0.000005	0.153842
160	4-May-89	-	-0.001595	0.000000	-0.210264
161	5-May-89	-	-0.001249	0.000000	-0.164652
162	8-May-89	0.011244	0.011244	0.000150	1.482262
163	9-May-89	-	-0.000788	0.000000	-0.103880
164	10-May-	-	-0.001792	0.000001	-0.236234
165	11-May-	-	-0.006751	0.000033	-0.889963
166	12-May-	-	-0.001198	0.000000	-0.157929
167	15-May-	-	-0.011003	0.000100	-1.450491
168	16-May-	0.000916	0.000916	0.000004	0.120753
169	17-May-	-	-0.007688	0.000045	-1.013485
170	18-May-	0.006828	0.006828	0.000061	0.900114
171	19-May-	0.002463	0.002463	0.000012	0.324690
172	22-May-	0.005697	0.005697	0.000045	0.751018
173	23-May-	0.001443	0.001443	0.000006	0.190226
174	24-May-	0.003554	0.003554	0.000021	0.468513

s	**0.007586**	
CAAR(t_1,t_2)	-0.085597	
$t_{(CAAR)}$	-1.209770	
$\lvert t_{(CAAR)} \rvert$	1.209770	< 1.988

As shown below, the results of the t-test performed on the time-series mean abnormal returns over the second half of the event window, after the event date, come to verify the previous conclusions, since the calculated t-statistic is statistically insignificant :

Count	44	
Average	-0.002289	
St.Deviation	0.008219	
St.Error	0.001239	
t-statistic	-1.84769	
|t-stat|	1.84769	<2.015 = t-critical

Finally, we once again apply the formulas $CAR = \sum_{t=t_1}^{t_2} AR_t$ and $CAAR = \frac{1}{N}\sum_{i=1}^{N} CAR_i$ in SPSS, as discussed in Chapter 3, and for each day CAR would be equal to the cumulative AR and CAAR would be equal to the average CAR up to that point:

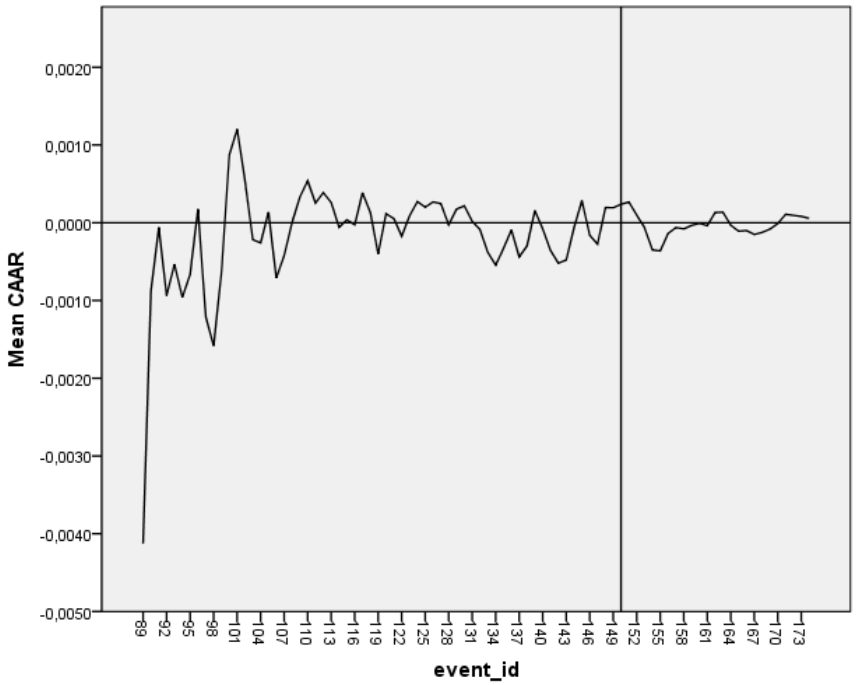
$$CAR = AR + lag(AR, 1)$$

$$CAAR = CAR/(event\_id - 87 + 1)$$

where $(event\_id - 87 + 1)$ is the number of days counting from the first day of the event window.

This way, CAAR shows the evolution of CAR over time, and the null hypothesis would require that H_0: $\overline{CAAR} = 0$ versus H_1: $\overline{CAAR} \neq 0$, where $\overline{CAAR}$ would refer to the CAAR of the entire event window.

Both the numerical results available in Appendix B and the graph below show that $\overline{CAAR}$ is approximately zero, not only around the CSR event (date = 24.03.1989, event_id=131), but throughout the entire event window.



Consequently, it appears that the null hypothesis should be accepted. To verify this assumption, we then perform a one-sample t-test on CAAR, with the following results :

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
CAAR	86	-,000125	,0005983	,0000645

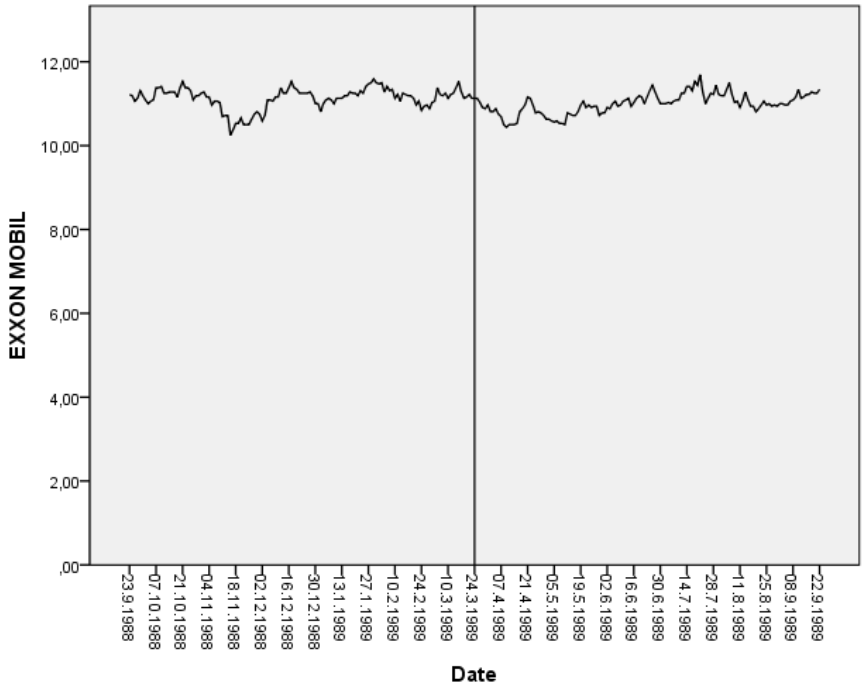
One-Sample Test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
CAAR	-1,941	85	,056	-,0001252	-,000253	,000003

If the absolute value of the observed t is less than the two-tailed critical t, then H_0 cannot be rejected, implying no statistical significance. (Fu, 2011) Therefore, in this case, where the critical t is 1.988 (available from the table of critical t values) and the absolute value of the observed t is 1.941, we fail to reject H_0, which means that there is insufficient evidence to conclude that the mean CAAR is different than zero. Consequently, the CSR event does not appear to influence EXXONMOBIL's stock performance during the event window.

Conclusions

The event study performed on this event, with all four different statistical tests, has demonstrated that the CSR event involving the oil spill generated by the ExxonMobil Valdez accident on 24 March, has not caused a statistically significant impact on the company's share price in the event window. The historical data support this assumption, as shown in the graph below, which does not demonstrate any significant change in the trend of the stock price.



4.4 HSBC Money Laundering Scandal

The third event refers to the involvement of HSBC in a money-laundering case, for which the bank did not eventually face criminal charges, but was lead to agree to a $1.92 billion settlement with authorities. The settlement, announced on December 04, 2012, was a victory for US state and federal authorities, although it rose questions on the integrity of both the financial and justice system. (Protess & Silver-Greenberg, 2012)

Obviously, the CSR event date is the 4th of December, 2012, with the estimation window expanding from 06/06/2012 to 04/10/2012 and the event window involving the trading days between 05/10/2012 and 04/02/2013.

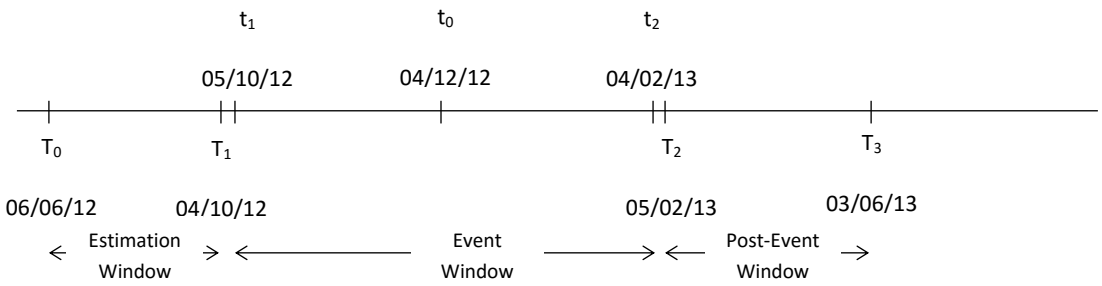


Figure 4.3 Visual Display of Estimation & Event Window

Again, all calculations have been performed via SPSS. The results presented in this section are fully available in Appendix A.

The historical data on both the share price of HSBC and the stock market index (FTSE) was collected and imported in SPSS[6], with this being one more single-stock, single-event case, so the methodology applied is the same as the previous two events.

Daily continuously compounded returns were calculated into two new variables, R_i and R_m, respectively via the following formulas in SPSS:

and R_m, respectively via the following formulas in SPSS:

$$Ri = \ln(HSBC/lag(HSBC, 1))$$

$$Rm = \ln(FTSE/lag(FTSC, 1))$$

[6] to facilitate calculations later the data inserted included trading days since the starting date of the estimation window

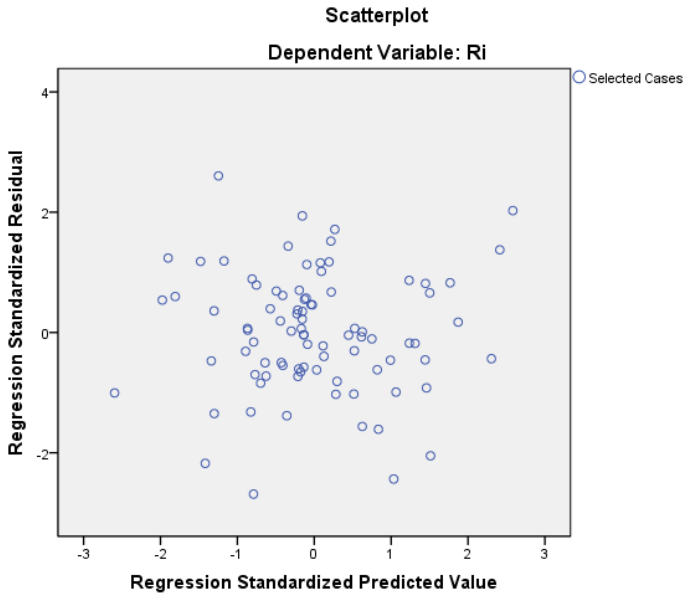
where lag (variable, 1) refers to the value of the variable in the previous trading day.

The auxiliary variable *event_id* was created, to be used later for case filtering regarding the estimation and event windows and referring to each case or distinct trading day. The estimation window lies between cases for which event_id <= 89, while for the event window event_id>=90 & event_id <= 176.

Linear regression was applied to estimate the parameters $\hat{\alpha}_i$ and $\hat{\beta}_i$ of the market model $R_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{m,t} + \varepsilon_{i,t}$, using the data from the estimation window, for which event_id <= 87. The results of the linear regression are available in Appendix A.

The estimated values of parameters $\hat{\boldsymbol{\alpha}}_{\boldsymbol{i}}$ and $\widehat{\boldsymbol{\beta}_{\boldsymbol{i}}}$ were **0.000** and **1.364** respectively.

The same robustness checks were performed to the market regression model applied earlier to calculate the expected daily returns. On one hand, he Durbin-Watson statistic was found equal to 1.784, which exceeds the DW bounds (1.496, 1.541) for the specified sample size and number of regressors (k=1, n=88), leading to accept the null hypothesis that the residuals from an OLS regression are not auto correlated. On the other hand, the scatterplot of standardized residuals versus standardized predicted values showed no indications of heteroscedasticity.



Then, the daily expected return of the share price in the event period was computed using the formula

$$Rexp = 0.000 + 1.364 * Rm$$

under the condition requiring all cases within the event window, that is event_id>=90 & event_id <= 176.

The daily abnormal returns for the same period were calculated by subtracting the expected daily returns from the actually observed values

$$AR = Ri - Rexp$$

The results of the calculations are available in Appendix B.

In this single-stock, single-event case, as described in Sections 3.8 and 3.10, the cumulative abnormal return (CAR), as well as CAAR, over the entire event window, is equal to the sum of ARs or **0.080188**. Therefore, during the period of the event window, the average abnormal returns have been increased by 8%, which is a fairly smaller percent than the approximately 18%[7] increase in the stock's actual price, during the same period. So far, it has been demonstrated that the stock price of HSBC has increased during the event window. The statistical tests performed help identify whether there is actually a significant impact.

Again, the average abnormal returns were calculated for each trading day, which were equal to the abnormal returns computed earlier, since there is only one stock and one event. Then, the t-value was calculated for each AAR_t, to test whether each daily average abnormal return was statistically different from 0. Each t-value was compared to the two-tailed critical ($a = 0.05$ and $df = 86$), available from the table of critical t values, which in this case was equal to 1.988.

It appears that neither on the actual event date nor on most trading days of the entire event window were the average abnormal returns significantly different from 0. In fact, on the date of the event (04/12/2012, event_id=132), the AAR were equal to 0.000983 with a t-value of 0.182<1.988, which implied no statistically significant abnormal returns.

[7] The average change in the actual stock price over the period of the event window is equal to [HSBC(t_2)- HSBC (t_1)]/ HSBC (t_1), where t_1 is the first trading day and t_2 the last trading day of the event window.

Within the event window, the values of AAR fluctuated around 0, with only five trading days having statistically significant AAR values.

Consequently, the first statistical test showed that the CSR event did not have a statistically significant impact on the company's share performance.

The second test regarded the significance of the CAAR over the entire event window, which was equal to 0.080188. Its t-value was computed to be -1.592170. Thus, its absolute value was less than the critical value (1.988), which implied that the overall CAAR was not statistically significant. The results of the aforementioned calculations are summarized in the table below.

event_id	Date	AR_t	AAR_t	$(AAR_t - \overline{AAR})^2$	t-value (AAR_t)
90	5-Oct-12	0.001656	0.001656	0.000001	0.306690
91	8-Oct-12	0.000128	0.000128	0.000001	0.023706
92	9-Oct-12	-	-0.000716	0.000003	-0.132603
93	10-Oct-12	0.005525	0.005525	0.000021	1.023227
94	11-Oct-12	0.000341	0.000341	0.000000	0.063153
95	12-Oct-12	0.005364	0.005364	0.000020	0.993410
96	15-Oct-12	0.005474	0.005474	0.000021	1.013782
97	16-Oct-12	0.002497	0.002497	0.000002	0.462443
98	17-Oct-12	-	-0.006569	0.000056	-1.216575
99	18-Oct-12	0.005415	0.005415	0.000020	1.002855
100	19-Oct-12	0.002229	0.002229	0.000002	0.412810
101	22-Oct-12	0.007445	0.007445	0.000043	1.378810
102	23-Oct-12	0.011565	0.011565	0.000113	2.141832
103	24-Oct-12	-	-0.006358	0.000053	-1.177498
104	25-Oct-12	0.006473	0.006473	0.000031	1.198796
105	26-Oct-12	-	-0.006270	0.000052	-1.161201
106	29-Oct-12	0.003549	0.003549	0.000007	0.657273
107	30-Oct-12	-	-0.011693	0.000159	-2.165537
108	31-Oct-12	0.011171	0.011171	0.000105	2.068863
109	1-Nov-12	0.007703	0.007703	0.000046	1.426591
110	2-Nov-12	0.000217	0.000217	0.000000	0.040188
111	5-Nov-12	-	-0.006150	0.000050	-1.138977
112	6-Nov-12	-	-0.004697	0.000032	-0.869882
113	7-Nov-12	-	-0.000821	0.000003	-0.152049
114	8-Nov-12	-	-0.004420	0.000029	-0.818582
115	9-Nov-12	-	-0.001818	0.000008	-0.336693
116	12-Nov-	0.005384	0.005384	0.000020	0.997114
117	13-Nov-	0.003437	0.003437	0.000006	0.636530
118	14-Nov-	0.005984	0.005984	0.000026	1.108233
119	15-Nov-	0.007768	0.007768	0.000047	1.438629
120	16-Nov-	0.008258	0.008258	0.000054	1.529377
121	19-Nov-	0.005305	0.005305	0.000019	0.982483
122	20-Nov-	-	-0.008644	0.000092	-1.600864
123	21-Nov-	0.004747	0.004747	0.000015	0.879142
124	22-Nov-	-	-0.002765	0.000014	-0.512076
125	23-Nov-	-	-0.000354	0.000002	-0.065561
126	26-Nov-	-	-0.001851	0.000008	-0.342804

127	27-Nov-	-	-0.001608	0.000006	-0.297801
128	28-Nov-	0.002216	0.002216	0.000002	0.410402
129	29-Nov-	-	-0.001631	0.000007	-0.302060
130	30-Nov-	0.010421	0.010421	0.000090	1.929963
131	3-Dec-12	-	-0.003854	0.000023	-0.713759
132	**4-Dec-12**	**0.000983**	**0.000983**	**0.000000**	**0.182051**
133	5-Dec-12	0.006997	0.006997	0.000037	1.295840
134	6-Dec-12	-	-0.002626	0.000013	-0.486334
135	7-Dec-12	-	-0.003307	0.000018	-0.612455
136	10-Dec-12	-	-0.005402	0.000040	-1.000447
137	11-Dec-12	0.004830	0.004830	0.000015	0.894513
138	12-Dec-12	-	-0.006350	0.000053	-1.176016
139	13-Dec-12	0.003109	0.003109	0.000005	0.575785
140	14-Dec-12	-	-0.000995	0.000004	-0.184273
141	17-Dec-12	0.002059	0.002059	0.000001	0.381326
142	18-Dec-12	-	-0.007497	0.000071	-1.388440
143	19-Dec-12	0.013906	0.013906	0.000169	2.575383
144	20-Dec-12	-	-0.003861	0.000023	-0.715055
145	21-Dec-12	0.003746	0.003746	0.000008	0.693757
146	24-Dec-12	0.004717	0.004717	0.000014	0.873586
147	25-Dec-12	0.000000	0.000000	0.000001	0.000000
148	26-Dec-12	0.000000	0.000000	0.000001	0.000000
149	27-Dec-12	-	-0.004465	0.000029	-0.826916
150	28-Dec-12	0.005569	0.005569	0.000022	1.031376
151	31-Dec-12	-	-0.000420	0.000002	-0.077784
152	1-Jan-13	0.000000	0.000000	0.000001	0.000000
153	2-Jan-13	-	-0.000992	0.000004	-0.183718
154	3-Jan-13	-	-0.009330	0.000105	-1.727911
155	4-Jan-13	-	-0.001884	0.000008	-0.348916
156	7-Jan-13	0.003570	0.003570	0.000007	0.661162
157	8-Jan-13	-	-0.008098	0.000081	-1.499745
158	9-Jan-13	0.005995	0.005995	0.000026	1.110271
159	10-Jan-13	0.004572	0.004572	0.000013	0.846732
160	11-Jan-13	0.001886	0.001886	0.000001	0.349286
161	14-Jan-13	0.000253	0.000253	0.000000	0.046855
162	15-Jan-13	0.003498	0.003498	0.000007	0.647828
163	16-Jan-13	0.008551	0.008551	0.000058	1.583640
164	17-Jan-13	0.004877	0.004877	0.000016	0.903218
165	18-Jan-13	-	-0.000852	0.000003	-0.157790
166	21-Jan-13	-	-0.003573	0.000020	-0.661718
167	22-Jan-13	-	-0.003202	0.000017	-0.593009
168	23-Jan-13	-	-0.001045	0.000004	-0.193533
169	24-Jan-13	-	-0.000725	0.000003	-0.134270
170	25-Jan-13	0.003384	0.003384	0.000006	0.626715
171	28-Jan-13	0.007368	0.007368	0.000042	1.364549
172	29-Jan-13	-	-0.005495	0.000041	-1.017671
173	30-Jan-13	0.009004	0.009004	0.000065	1.667536
174	31-Jan-13	-	-0.000263	0.000001	-0.048707
175	1-Feb-13	-	-0.011166	0.000146	-2.067937
176	4-Feb-13	0.002809	0.002809	0.000004	0.520225

s	**0.005400**
CAAR(t_1,t_2)	0.080188
$t_{(CAAR)}$	1.592170
$\lvert t_{(CAAR)} \rvert$	1.592170

< 1.988

The results of the t-test performed on the time-series mean abnormal returns over the second half of the event window, after the event date, which are summarized in the following table lead to the same conclusions, since the calculated t-statistic is statistically insignificant :

Count	45	
Average	0.000447	
St.Deviation	0.005207	
St.Error	0.000776	
t-statistic	0.576463	
|t-stat|	0.576463	<2.013 = t-critical

The formulas $CAR = \sum_{t=t_1}^{t_2} AR_t$ and $CAAR = \frac{1}{N}\sum_{i=1}^{N} CAR_i$ are again applied in SPSS, as discussed in Chapter 3, and for each day CAR would be equal to the cumulative AR and CAAR would be equal to the average CAR up to that point:

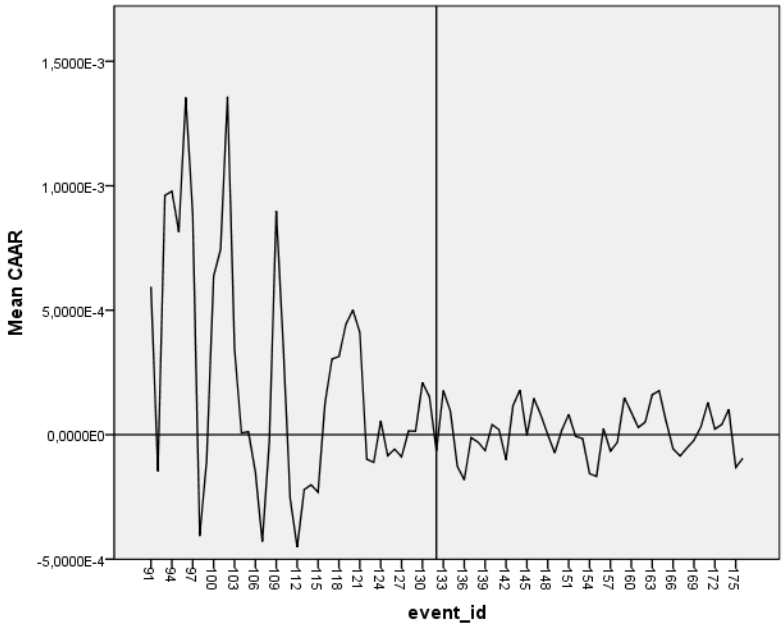
$$CAR = AR + lag(AR, 1)$$

$$CAAR = CAR/(event\_id - 89 + 1)$$

where $(event\_id - 89 + 1)$ is the number of days counting from the first day of the event window.

Therefore, as already explained in previous sections, the null hypothesis would require that H_0: $\overline{CAAR} = 0$ versus H_1: $\overline{CAAR} \neq 0$, where $\overline{CAAR}$ would refer to the CAAR of the entire event window.

The graph below shows that $\overline{CAAR}$ is approximately zero around the CSR event (date = 04.12.2012, event_id=132) :



A one-sample t-test on CAAR, is performed to examine whether the null hypothesis should be rejected, with the following results:

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
CAAR	86	,000115	,0003500	,0000377

One-Sample Test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
CAAR	3,052	85	,003	,0001152	,000040	,000190

In this case, where the critical t is 1.988 (available from the table of critical t values) and the absolute value of the observed t is 3.052, we have to reject H_0, which means that there is evidence to conclude that the mean CAAR is different than zero. Consequently, the CSR event appears to have a statistically significant influence on HSBC's stock performance during the event window. However, although it appears statistically significant, it actually approximates zero.

Conclusions

The event study performed on this event has demonstrated that the CSR event of the record $1.92 billion settlement between HSBC and US authorities regarding the money-laundering scandal that had erupted did not appear to significantly affect the already positive trend of the share performance. Only one of the tests indicated statistically significant results, however their magnitude was minimal, since the progressive values of CAAR kept fluctuating around 0, regardless of the statistical significance of the results. The historical data, graphically displayed in the chart below, shows that the upward trend that HSBC's actual stock price was strong during the event window, especially after the CSR announcement, and subsided in the post-event window, with several intense fluctuations.

4.5 Libor Scandal

The fourth case is different from those previously presented, since it involves three distinct CSR events regarding three different firms, yet all related more or less to the Libor Scandal, in which financial institutions were accused of fixing the London Interbank Offered Rate (LIBOR). Peaking in 2008, the scandal involved bankers from several financial institutions who provided information on the interest rates they would use to calculate LIBOR. It has been estimated that this collusion has been active since 2005. (Investopedia)

The CSR events are related to the announcement of settlements between two financial institutions (Barclays and Royal Bank of Scotland) and the US and UK authorities, as well as the conviction of a third institution's former executives (UBS).

In detail, the first event refers to the $453 million settlement agreed between Barclays and the US and UK authorities announced in the 27th of June, 2012 (Alper & Ridley, 2012). The second event involves the conviction of three former UBS executives for frauds regarding contracts related to the investment of Municipal Bond Proceeds, announced on August 31, 2012. Finally, the third event refers to the $612 million fine imposed by UK and US authorities on RBS for its part in the Libor scandal, in February 6, 2013.

Therefore, this is a multiple-stock, multiple-event case, in which the calculations regarding the hypothesis testing are fairly different from those performed earlier, since they are performed in Excel and not in SPSS, due to the different estimation and event windows for each event and stock.

The estimation and event windows of all three events are available in the following table.

DATE	**Barclays**	**RBS**	**UBS**
Event Date	27/06/12	06/02/13	31/08/12
Estimation Window	02/01/12 – 27/04/12	10/08/12 – 07/12/12	05/03/12 – 02/07/12
Event Window	28/04/12 – 27/08/12	10/12/12 – 08/04/13	03/07/12 – 30/12/12
Post-Event Window	28/08/12 – 25/12/12	09/04/13 – 07/08/13	05/03/12 – 02/07/12

For each stock and event, the first steps of the analysis performed in SPSS are identical to those described in the previous sections. In other words, after the data for Barclays, UBS and RBS share prices, as well as FTSE and NYSE indexes, was collected, it was imported in

SPSS, where the daily continuously compounded returns were calculated into new variables, R_i and R_m, respectively via the following formulas in SPSS:

$$Ri1 = \ln(BARCLAYS/lag(BARCLAYS, 1))$$

$$Rm1 = \ln(FTSE/lag(FTSE, 1))$$

$$Ri2 = \ln(RBS/lag(RBS, 1))$$

$$Rm2 = \ln(FTSE/lag(FTSE, 1))$$

$$Ri3 = \ln(UBS/lag(UBS, 1))$$

$$Rm3 = \ln(NYSE/lag(NYSE, 1))$$

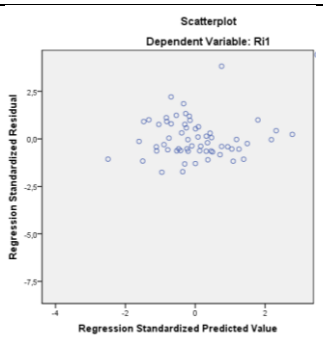
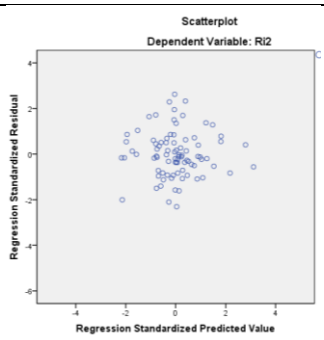
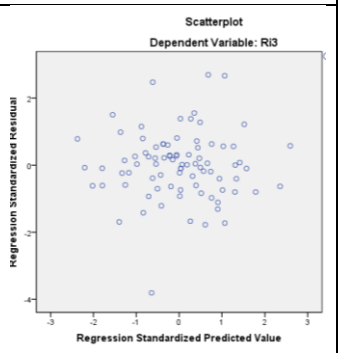
where lag (variable, 1) refers to the value of the variable in the previous trading day.

The auxiliary variable *event_id* was created, to be used later for case filtering regarding the estimation and event windows and referring to each case or distinct trading day :

event_id	**Barclays**	**RBS**	**UBS**
Event Date	128	129	130
Estimation Window	1 – 62	1 – 86	1 – 86
Event Window	63 - 171	87 – 172	87 – 172
Post-Event Window	172 - 257	173 – 259	173 – 259

Linear regression was applied to estimate the parameters $\hat{\alpha}_i$ and $\hat{\beta}_i$ of the market model $R_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{m,t} + \varepsilon_{i,t}$, using the data from the estimation window, for which event_id <= 87. The results of each linear regression are available in Appendix A.

The results for all three regressions are available below, together with their values of the Durbin-Watson statistic and the scatterplot of standardized residuals versus standardized predicted values, which do not indicate any heteroscedasticity. As for the DW test, in the RBS model, the Durbin-Watson statistic is smaller than the lower than the DW bounds (1.481, 1.529) for the specified number of regressors and sample size (k=1, n=85), indicating positive first-order autocorrelation, while in the UBS model, the DW statistic falls between the DW bounds (1.481, 1.529), which would render the test inconclusive. Since it is almost equal to the upper bound, it is assumed that there is no autorrelation.

Regression Results	Barclays	RBS	UBS
Estimated Parameters	$\widehat{a_i} = 0.004$ $\widehat{\beta_i} = 2.106$	$\widehat{a_i} = 0.003$ $\widehat{\beta_i} = 1.756$	$\widehat{a_i} = 0.002$ $\widehat{\beta_i} = 0.829$
Durbin-Watson stat.	$DW = 1.963 > 1.449$	$DW = 1.424 < 1.481$	$1.481 < DW = 1.528 < 1.529$
Plot of Residuals vs Predicted Values			

Then, the daily expected return of each share price in each event period was computed using the formula

$$Rexp = \widehat{a_i} + \widehat{\beta_i} * Rm$$

under the condition requiring all cases within each event window.

The daily abnormal returns for the respective period were calculated by subtracting the expected daily returns from the actually observed values

$$AR = Ri - Rexp$$

The results of the calculations are available in Appendix B.

The next steps, which involved the calculation of each stock's CAR and the overall CAAR, as well as the statistical test on CAAR were performed in Excel :

CAR1	**CAR2**	**CAR3**	**CAAR**
-0.6970	-0.4790	-0.7110	**-0.6290**

(CAR1-CAAR)²	**(CAR2-CAAR)²**	**(CAR1-CAAR)²**
0.0046	0.0225	0.0067

T **-64.3987** ⇨ **|t|> 4.303 = t_{crit}** ⇨ **H_0 rejected**

S 0.0169

In detail, the cumulative abnormal returns for each stock (CAR1, CAR2 and CAR3) were calculated by summing their abnormal returns during their respective event window (AR1, AR2 and AR3). Then, CAAR was found by summing these three values and dividing the sum with the number of stocks :

$$CAAR = \frac{1}{3}(CAR1 + CAR2 + CAR3)$$

To calculate the t-test value, first the sample standard deviation was computed as

$$s = \sqrt{\frac{1}{3-1}[(CAR1 - CAAR)^2 + (CAR2 - CAAR)^2 + (CAR3 - CAAR)^2]}$$

Finally, $t = \sqrt{3}\frac{\text{CAAR}}{\text{s}} = -64.3987 > 4.303 = t_{crit}\,|_{a=0.05,\ df=3-1}$

Consequently, the null hypothesis is rejected, leading to the assumption that the there is adequate evidence to support that the mean CAAR is different than zero. Consequently, the CSR events related to the Libor scandal in combination seem to influence the stock performance of each financial institution.

The previous solution may be subject to significant error, limiting its reliability, since the standard deviation is estimated using a fairly small number of observations (3 observations, one per event). An alternative approach is described next. After the ARs have been calculated for each trading date, then the data from all three event windows are gathered in a single table. The AAR for each trading day is equal either to the AR of the respective single stock, or, to the average abnormal returns of the multiple stocks, when the event windows overlap. Then, the same procedure is followed as with the previous single-event, single-stock cases. The AAR of each trading day is tested for statistical significance. Then the CAAR of the entire event window is calculated and also tested for statistical significance. These calculations are presented in the next table :

Date	**AR_{t1}**	**AR_{t2}**	**AR_{t2}**	**AAR_t**	$(AAR_t - \overline{AAR})^2$	**t-value (AAR_t)**
28.03.2012	-			-0.005294	0.000010	-0.275019
29.03.2012	-			-0.027340	0.000359	-1.420290
30.03.2012	-			-0.008963	0.000000	-0.465620
02.04.2012	-			-0.037411	0.000841	-1.943469
03.04.2012	-			-0.017018	0.000074	-0.884071
04.04.2012	-			-0.007673	0.000001	-0.398606
05.04.2012	-			-0.007675	0.000001	-0.398710

06.04.2012	-			-0.004000	0.000019	-0.207797
09.04.2012	-			-0.004000	0.000019	-0.207797
10.04.2012	-			-0.017438	0.000082	-0.905889
11.04.2012	0.009039			0.009039	0.000304	0.469568
12.04.2012	0.019995			0.019995	0.000807	1.038723
13.04.2012	-			-0.021276	0.000166	-1.105270
16.04.2012	-			-0.028618	0.000409	-1.486681
17.04.2012	0.004094			0.004094	0.000156	0.212680
18.04.2012	-			-0.025058	0.000277	-1.301742
19.04.2012	-			-0.012865	0.000020	-0.668326
20.04.2012	-			-0.008197	0.000000	-0.425827
23.04.2012	-			-0.007841	0.000000	-0.407333
24.04.2012	0.010793			0.010793	0.000369	0.560687
25.04.2012	-			-0.007464	0.000001	-0.387748
26.04.2012	-			-0.005510	0.000008	-0.286240
27.04.2012	0.031953			0.031953	0.001629	1.659931
30.04.2012	-			-0.011591	0.000010	-0.602143
01.05.2012	0.004609			0.004609	0.000169	0.239434
02.05.2012	-			-0.041364	0.001086	-2.148824
03.05.2012	-			-0.010841	0.000006	-0.563181
04.05.2012	0.015991			0.015991	0.000595	0.830719
07.05.2012	-			-0.004000	0.000019	-0.207797
08.05.2012	0.007772			0.007772	0.000262	0.403749
09.05.2012	0.001838			0.001838	0.000105	0.095483
10.05.2012	0.022101			0.022101	0.000931	1.148128
11.05.2012	-			-0.045102	0.001347	-2.343010
14.05.2012	-			-0.028290	0.000395	-1.469641
15.05.2012	-			-0.012921	0.000020	-0.671235
16.05.2012	0.024273			0.024273	0.001068	1.260962
17.05.2012	-			-0.016310	0.000063	-0.847291
18.05.2012	-			-0.008317	0.000000	-0.432061
21.05.2012	0.003204			0.003204	0.000135	0.166445
22.05.2012	0.005447			0.005447	0.000192	0.282967
23.05.2012	0.004545			0.004545	0.000168	0.236109
24.05.2012	-			-0.010963	0.000007	-0.569518
25.05.2012	-			-0.024229	0.000250	-1.258676
28.05.2012	-			-0.009712	0.000002	-0.504530
29.05.2012	-			-0.017638	0.000085	-0.916279
30.05.2012	0.024399			0.024399	0.001076	1.267507
31.05.2012	-			-0.031064	0.000513	-1.613748
01.06.2012	0.004120			0.004120	0.000157	0.214030
04.06.2012	-			-0.004000	0.000019	-0.207797
05.06.2012	-			-0.004000	0.000019	-0.207797
06.06.2012	0.026164			0.026164	0.001195	1.359197
07.06.2012	-			-0.002255	0.000038	-0.117145
08.06.2012	-			-0.012133	0.000014	-0.630299
11.06.2012	-			-0.001870	0.000043	-0.097145
12.06.2012	-			-0.024190	0.000249	-1.256650
13.06.2012	-			-0.015545	0.000051	-0.807549
14.06.2012	0.025800			0.025800	0.001170	1.340288
15.06.2012	0.032411			0.032411	0.001666	1.683724
18.06.2012	-			-0.032667	0.000589	-1.697023
19.06.2012	-			-0.017280	0.000079	-0.897681
20.06.2012	0.007843			0.007843	0.000264	0.407437
21.06.2012	0.000129			0.000129	0.000073	0.006701
22.06.2012	0.008125			0.008125	0.000273	0.422087
25.06.2012	-			-0.012457	0.000016	-0.647130
26.06.2012	-			-0.012149	0.000014	-0.631130
27.06.2012	**-**			**-0.014764**	**0.000040**	**-0.766977**
28.06.2012	-			-0.161009	0.023288	-8.364280
29.06.2012	-			-0.050472	0.001770	-2.621977

02.07.2012	0.003428			0.003428	0.000140	0.178082
03.07.2012	-		0.008183	-0.010697	0.000005	-0.555700
04.07.2012	-		-0.008000	-0.008549	0.000000	-0.444113
05.07.2012	0.006131		-0.011999	-0.002934	0.000030	-0.152419
06.07.2012	-		0.008844	-0.002354	0.000037	-0.122288
09.07.2012	0.000922		-0.014045	-0.006562	0.000003	-0.340864
10.07.2012	0.004117		-0.005687	-0.000785	0.000058	-0.040780
11.07.2012	-		-0.025347	-0.021866	0.000181	-1.135894
12.07.2012	0.010016		0.000933	0.005475	0.000193	0.284396
13.07.2012	-		-0.002388	-0.018128	0.000095	-0.941734
16.07.2012	-		0.003130	-0.013693	0.000028	-0.711314
17.07.2012	0.016709		-0.024244	-0.003768	0.000021	-0.195718
18.07.2012	-		-0.018215	-0.018062	0.000093	-0.938305
19.07.2012	0.010795		0.004598	0.007697	0.000259	0.399827
20.07.2012	-		0.004089	-0.003851	0.000021	-0.200030
23.07.2012	-		0.007823	0.002616	0.000121	0.135899
24.07.2012	-		-0.006199	-0.004915	0.000012	-0.255330
25.07.2012	-		-0.011104	-0.007558	0.000001	-0.392606
26.07.2012	-		-0.048679	-0.030539	0.000490	-1.586449
27.07.2012	0.059326		-0.021469	0.018929	0.000747	0.983319
30.07.2012	-		-0.006599	-0.007168	0.000002	-0.372371
31.07.2012	0.002665		-0.002407	0.000129	0.000073	0.006701
01.08.2012	-		-0.021059	-0.026019	0.000310	-1.351639
02.08.2012	-		-0.012460	-0.017052	0.000075	-0.885837
03.08.2012	0.004285		-0.009371	-0.002543	0.000034	-0.132107
06.08.2012	0.021803		-0.000243	0.010780	0.000368	0.560012
07.08.2012	-		-0.013562	-0.007223	0.000001	-0.375203
08.08.2012	-		-0.029449	-0.020102	0.000137	-1.044282
09.08.2012	-		-0.025218	-0.015616	0.000052	-0.811212
10.08.2012	0.022144		-0.001414	0.010365	0.000352	0.538453
13.08.2012	-		-0.019272	-0.009835	0.000002	-0.510920
14.08.2012	-		-0.006753	-0.003962	0.000020	-0.205823
15.08.2012	-		0.004310	-0.001322	0.000050	-0.068651
16.08.2012	0.012237		-0.014934	-0.001349	0.000050	-0.070053
17.08.2012	0.024620		-0.015199	0.004711	0.000172	0.244706
20.08.2012	-		0.017729	0.006846	0.000233	0.355618
21.08.2012	0.015750		-0.018540	-0.001395	0.000049	-0.072469
22.08.2012	0.011394		-0.004513	0.003441	0.000140	0.178731
23.08.2012	-		0.020465	-0.000384	0.000064	-0.019948
24.08.2012	-		-0.040316	-0.032205	0.000566	-1.673022
27.08.2012	-		-0.006144	-0.005072	0.000011	-0.263486
28.08.2012			-0.012368	-0.012368	0.000016	-0.642507
29.08.2012			0.000783	0.000783	0.000084	0.040676
30.08.2012			0.008561	0.008561	0.000288	0.444737
31.08.2012			**-**	**-0.013701**	**0.000028**	**-0.711755**
03.09.2012			-0.008000	-0.008000	0.000000	-0.415593
04.09.2012			0.003642	0.003642	0.000145	0.189199
05.09.2012			0.009639	0.009639	0.000326	0.500738
06.09.2012			-0.021516	-0.021516	0.000172	-1.117738
07.09.2012			-0.008575	-0.008575	0.000000	-0.445464
10.09.2012			-0.020779	-0.020779	0.000153	-1.079451
11.09.2012			-0.037240	-0.037240	0.000831	-1.934586
12.09.2012			0.026335	0.026335	0.001207	1.368081
13.09.2012			-0.033263	-0.033263	0.000618	-1.727984
14.09.2012			-0.013097	-0.013097	0.000022	-0.680378
17.09.2012			0.001976	0.001976	0.000108	0.102652
18.09.2012			-0.001460	-0.001460	0.000048	-0.075846
19.09.2012			-0.010548	-0.010548	0.000005	-0.547960
20.09.2012			-0.004644	-0.004644	0.000014	-0.241252
21.09.2012			-0.007197	-0.007197	0.000001	-0.373878
24.09.2012			-0.028183	-0.028183	0.000391	-1.464083

25.09.2012			0.015469	0.015469	0.000570	0.803601
26.09.2012			-0.007070	-0.007070	0.000002	-0.367280
27.09.2012			-0.013094	-0.013094	0.000022	-0.680222
28.09.2012			-0.013556	-0.013556	0.000027	-0.704223
01.10.2012			-0.001777	-0.001777	0.000044	-0.092314
02.10.2012			-0.006538	-0.006538	0.000003	-0.339644
03.10.2012			-0.004446	-0.004446	0.000016	-0.230966
04.10.2012			-0.016471	-0.016471	0.000065	-0.855654
05.10.2012			-0.014463	-0.014463	0.000037	-0.751340
08.10.2012			-0.028652	-0.028652	0.000410	-1.488447
09.10.2012			-0.005892	-0.005892	0.000006	-0.306084
10.10.2012			0.019634	0.019634	0.000786	1.019969
11.10.2012			-0.007568	-0.007568	0.000001	-0.393151
12.10.2012			-0.006944	-0.006944	0.000002	-0.360735
15.10.2012			-0.020426	-0.020426	0.000145	-1.061113
16.10.2012			-0.029511	-0.029511	0.000445	-1.533071
17.10.2012			-0.014565	-0.014565	0.000038	-0.756639
18.10.2012			0.006567	0.006567	0.000224	0.341150
19.10.2012			0.011397	0.011397	0.000392	0.592064
22.10.2012			-0.007230	-0.007230	0.000001	-0.375592
23.10.2012			0.009238	0.009238	0.000311	0.479906
24.10.2012			-0.021039	-0.021039	0.000160	-1.092958
25.10.2012			-0.018393	-0.018393	0.000100	-0.955501
26.10.2012			0.014682	0.014682	0.000533	0.762717
29.10.2012			-0.008000	-0.008000	0.000000	-0.415593
30.10.2012			-0.008000	-0.008000	0.000000	-0.415593
10.12.2012		-0.009167		-0.009167	0.000001	-0.476218
11.12.2012		-0.004326		-0.004326	0.000017	-0.224732
12.12.2012		0.003175		0.003175	0.000134	0.164939
13.12.2012		-0.002187		-0.002187	0.000039	-0.113613
14.12.2012		0.006297		0.006297	0.000216	0.327124
17.12.2012		-0.002135		-0.002135	0.000039	-0.110911
18.12.2012		0.001166		0.001166	0.000092	0.060573
19.12.2012		0.022619		0.022619	0.000962	1.175038
20.12.2012		0.005223		0.005223	0.000186	0.271330
21.12.2012		-0.005484		-0.005484	0.000009	-0.284889
24.12.2012		-0.001495		-0.001495	0.000048	-0.077664
25.12.2012		-0.003000		-0.003000	0.000029	-0.155847
26.12.2012		-0.003000		-0.003000	0.000029	-0.155847
27.12.2012		0.021888		0.021888	0.000918	1.137063
28.12.2012		0.004629		0.004629	0.000170	0.240473
31.12.2012		0.004570		0.004570	0.000168	0.237408
01.01.2013		-0.003000		-0.003000	0.000029	-0.155847
02.01.2013		-0.011703		-0.011703	0.000011	-0.607961
03.01.2013		-0.014209		-0.014209	0.000034	-0.738145
04.01.2013		-0.011095		-0.011095	0.000007	-0.576376
07.01.2013		0.004598		0.004598	0.000169	0.238862
08.01.2013		0.009415		0.009415	0.000318	0.489101
09.01.2013		0.021554		0.021554	0.000897	1.119712
10.01.2013		0.015705		0.015705	0.000581	0.815861
11.01.2013		0.001273		0.001273	0.000094	0.066131
14.01.2013		0.012252		0.012252	0.000427	0.636481
15.01.2013		-0.034662		-0.034662	0.000689	-1.800661
16.01.2013		-0.010530		-0.010530	0.000005	-0.547024
17.01.2013		-0.000633		-0.000633	0.000060	-0.032884
18.01.2013		0.004731		0.004731	0.000173	0.245771
21.01.2013		0.011759		0.011759	0.000407	0.610870
22.01.2013		-0.013448		-0.013448	0.000025	-0.698612
23.01.2013		-0.019046		-0.019046	0.000113	-0.989423
24.01.2013		-0.005382		-0.005382	0.000009	-0.279590
25.01.2013		-0.006006		-0.006006	0.000006	-0.312007

28.01.2013		-0.000602		-0.000602	0.000061	-0.031273
29.01.2013		-0.077127		-0.077127	0.004723	-4.006682
30.01.2013		0.005500		0.005500	0.000193	0.285720
31.01.2013		-0.001411		-0.001411	0.000049	-0.073300
01.02.2013		-0.030764		-0.030764	0.000500	-1.598163
04.02.2013		-0.010576		-0.010576	0.000005	-0.549414
05.02.2013		0.013656		0.013656	0.000487	0.709418
06.02.2013		**0.007025**		**0.007025**	**0.000238**	**0.364943**
07.02.2013		-0.011495		-0.011495	0.000010	-0.597155
08.02.2013		0.005470		0.005470	0.000192	0.284162
11.02.2013		-0.003144		-0.003144	0.000028	-0.163328
12.02.2013		0.019963		0.019963	0.000805	1.037061
13.02.2013		-0.012411		-0.012411	0.000016	-0.644741
14.02.2013		-0.008480		-0.008480	0.000000	-0.440529
15.02.2013		-0.013942		-0.013942	0.000031	-0.724275
18.02.2013		-0.014542		-0.014542	0.000038	-0.755444
19.02.2013		-0.002890		-0.002890	0.000030	-0.150133
20.02.2013		0.018264		0.018264	0.000711	0.948799
21.02.2013		0.004046		0.004046	0.000155	0.210186
22.02.2013		-0.019621		-0.019621	0.000126	-1.019294
25.02.2013		0.019567		0.019567	0.000782	1.016489
26.02.2013		-0.023456		-0.023456	0.000227	-1.218519
27.02.2013		0.002817		0.002817	0.000126	0.146341
28.02.2013		-0.080983		-0.080983	0.005268	-4.206998
01.03.2013		-0.038946		-0.038946	0.000933	-2.023211
04.03.2013		-0.016771		-0.016771	0.000070	-0.871239
05.03.2013		-0.007684		-0.007684	0.000001	-0.399177
06.03.2013		-0.013722		-0.013722	0.000028	-0.712846
07.03.2013		-0.025417		-0.025417	0.000289	-1.320391
08.03.2013		-0.005226		-0.005226	0.000010	-0.271486
11.03.2013		-0.024554		-0.024554	0.000261	-1.275559
12.03.2013		0.011572		0.011572	0.000399	0.601155
13.03.2013		-0.015578		-0.015578	0.000051	-0.809264
14.03.2013		-0.001377		-0.001377	0.000049	-0.071534
15.03.2013		0.018830		0.018830	0.000742	0.978202
18.03.2013		-0.029427		-0.029427	0.000442	-1.528707
19.03.2013		-0.011004		-0.011004	0.000007	-0.571648
20.03.2013		0.021582		0.021582	0.000899	1.121166
21.03.2013		0.010092		0.010092	0.000342	0.524271
22.03.2013		-0.028409		-0.028409	0.000400	-1.475823
25.03.2013		-0.020063		-0.020063	0.000136	-1.042256
26.03.2013		-0.012956		-0.012956	0.000021	-0.673053
27.03.2013		-0.031370		-0.031370	0.000527	-1.629645
28.03.2013		-0.015426		-0.015426	0.000049	-0.801367
29.03.2013		-0.003000		-0.003000	0.000029	-0.155847
01.04.2013		-0.003000		-0.003000	0.000029	-0.155847
02.04.2013		0.004848		0.004848	0.000176	0.251849
03.04.2013		-0.029285		-0.029285	0.000436	-1.521331
04.04.2013		0.030054		0.030054	0.001479	1.561280
05.04.2013		0.005290		0.005290	0.000188	0.274811
08.04.2013		-0.023311		-0.023311	0.000222	-1.210986

S	0.019250	
CAAR(t_1,t_2)	-1.652548	
$t_{(CAAR)}$	-5.529985	
$\lvert t_{(CAAR)} \rvert$	5.529985	>1.652

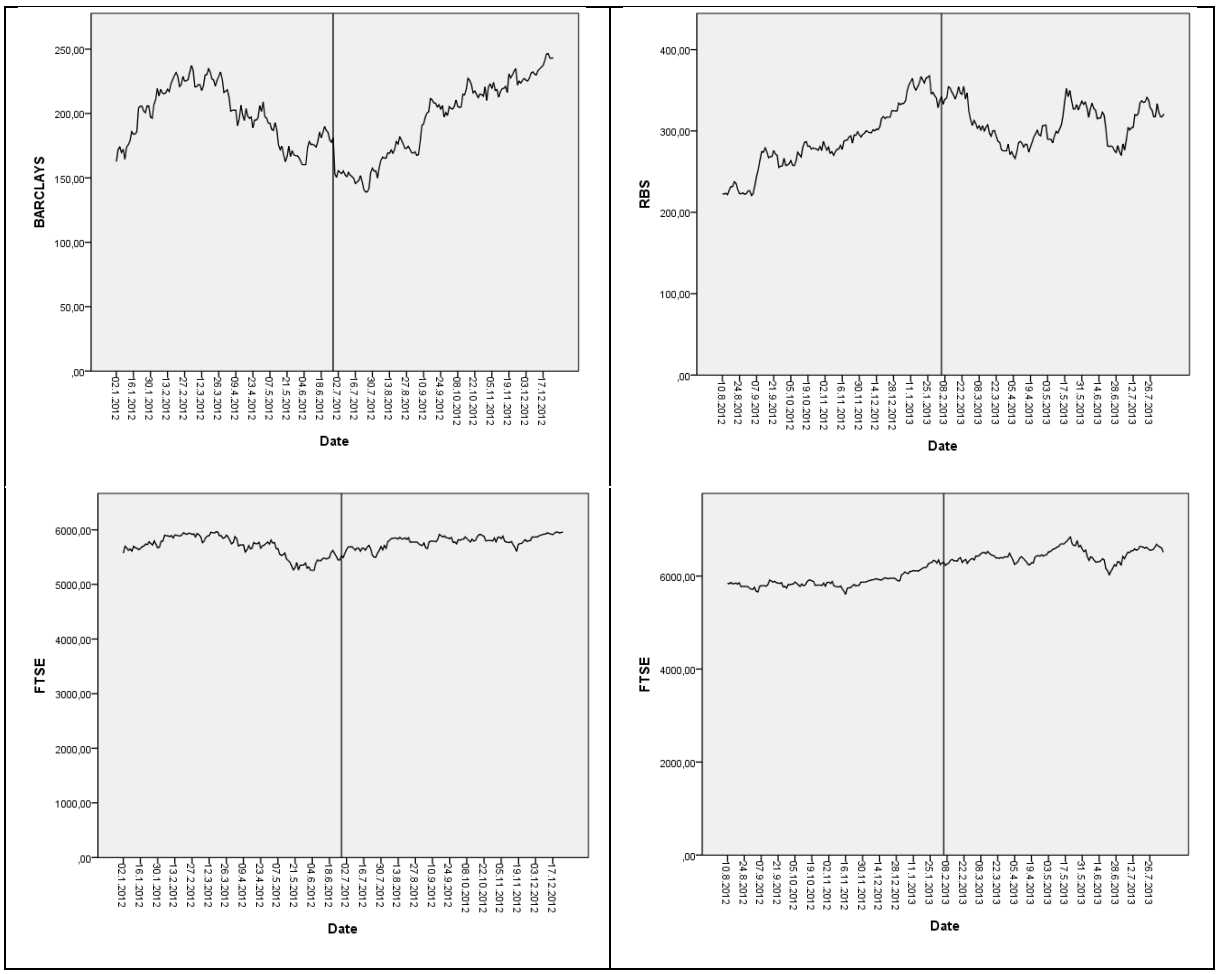
The individual assessment of the statistical significance of the average abnormal returns on a daily basis leads to only one interesting observation. The event date of the first event is followed by two trading dates with statistically significant abnormal returns which indicate a decrease in the first share price, as well as a deterioration in the overall impact of the events.

The calculation of the overall CAAR, which was proven statistically significant, suggests that the combination of the three events significally affects the financial performance of the institutions.

Conclusions

This event study performed has showed that the combination of three separate CSR events, related to one common event, that concerned three different financial institutions and occurred on different dates, therefore having different estimation and event windows, imposes a statistically significant influence on the share price evolution of each institution over their respective event window.

This is supported by the historical data, graphically displayed in the chart below, where RBS, which was involved in the latter of the three events chronologically, showed an upward trend before the event, while during the second half of the event window it decreased substantially, although the market index had a slightly upward trend. Barclays' share price was already on a downfall, which started to reverse into an upward trend since the last quarter of the event window. Finally, the stock price of UBS remains fairly stable, regardless of the event. Therefore, with the exception of UBS, which seems to follow its market's trend, the share prices of the other two institutions demonstrate significant fluctuations across the event window, with Barclays improving its performance and RBS deteriorating.


BARCLAYS
RBS
FTSE
FTSE
Date
Date
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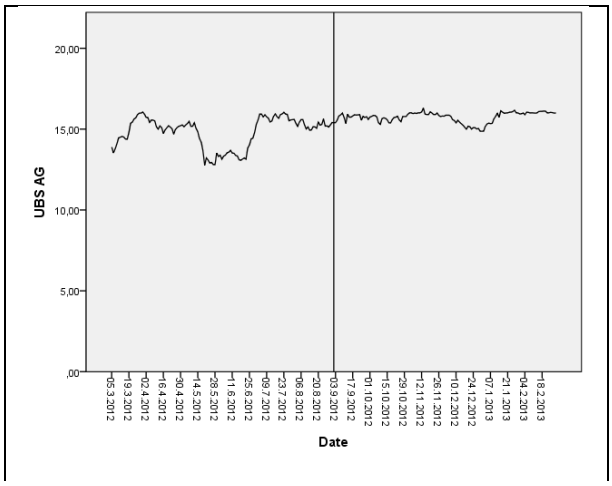
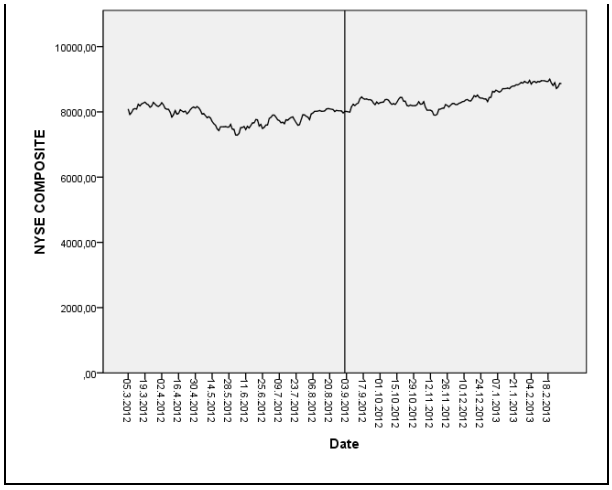

UBS AG
Date


NYSE COMPOSITE
10000,00
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05.3.2012
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16.4.2012
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14.5.2012
28.5.2012
11.6.2012
25.6.2012
09.7.2012
23.7.2012
06.8.2012
20.8.2012
03.9.2012
17.9.2012
01.10.2012
15.10.2012
29.10.2012
12.11.2012
26.11.2012
10.12.2012
24.12.2012
07.1.2013
21.1.2013
04.2.2013
18.2.2013
Date

4.6 Google & North Korea

The fifth CSR event case refers to the conflict between Google and North Korea, during the visit of Google's executive chairman, Eric Schmidt, in the country, in January 2013, when he warned North Korea to quickly liberate internet access unless the country wants to face continued isolation and economic decline. Schmidt's visit to North Korea was criticized by the US government. On the other hand, analysts characterized this initiative as an effort of expanding Google's global reach and increasing its share in digital advertising. In brief, this visit was deemed controversial, with mixed expectations regarding its impact on the company's financial performance. (McCurry, Kaiman, 2013)

The event date is the 10th of January, 2013, when Schmidt made this statement to the press. So, the estimation window expands from 13/07/2012 to 09/11/2012 and the event window from 12/11/2012 and 12/03/2013.

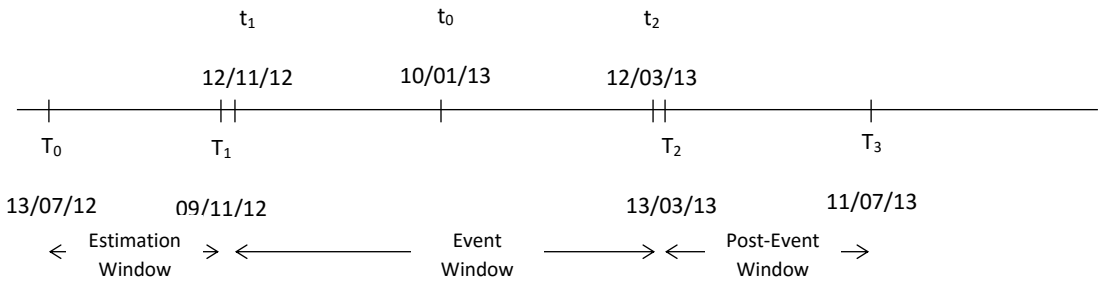


Figure 5. Visual Display of Estimation & Event Window

Calculations have been performed in SPSS. Their results are presented here and fully available in Appendix A.

The historical data on both the share price of Google and the stock market index (NASDAQ) was collected and imported in SPSS[8]. Once again, this is a single-stock, single-event case, applying the same steps as the previous cases , so the results are reported in brief.

First, daily continuously compounded returns were calculated into new variables, R_i and R_m, respectively via the following formulas in SPSS:

[8] to facilitate calculations later the data inserted included trading days since the starting date of the estimation window

$$Ri = \ln(GOOGLE/lag(GOOGLE, 1))$$

$$Rm = \ln(NASDAQ/lag(NASDAQ, 1))$$

where lag (variable, 1) refers to the value of the variable in the previous trading day.

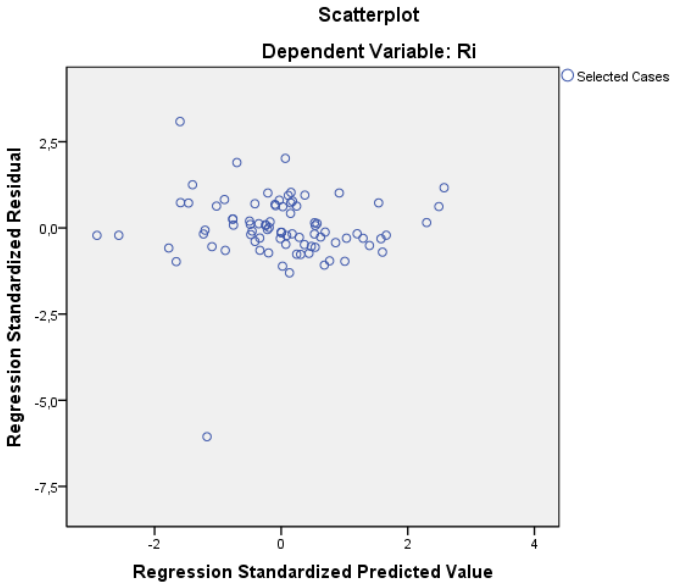
The auxiliary variable *event_id* was created, to be used later for case filtering regarding the estimation and event windows and referring to each case or distinct trading day. The estimation window lies between cases for which event_id <= 86, while for the event window event_id>=87 & event_id <= 173.

Linear regression was applied to estimate the parameters $\widehat{\alpha_i}$ and $\widehat{\beta_i}$ of the market model $R_{i,t} = \widehat{\alpha_i} + \widehat{\beta_i} R_{m,t} + \varepsilon_{i,t}$, using the data from the estimation window, for which event_id <= 87.

The entire results of the linear regression are available in Appendix A, however, the estimated values of parameters $\widehat{\boldsymbol{\alpha_i}}$ and $\widehat{\boldsymbol{\beta_i}}$ were **0.002** and **0.819** respectively.

Two robustness checks were performed to the market regression model applied earlier to calculate the expected daily returns. The first Durbin-Watson's test for autocorrelation. Its results are included in the detailed regression results presented in Appendix A, according to which, the DW statistic is equal to 1.895, which exceeds the DW bounds (1.496, 1.541) for the specified sample size and number of regressors (k=1, n=87). Therefore, the null hypothesis that the residuals from an OLS regression are not auto correlated is not rejected. In other words, there was no autocorrelation in the model examined.

The scatterplot of standardized residuals versus standardized predicted values, does not show any significant indications of heteroscedasticity.



The daily expected returns of the share price in the event period were then calculated as

$$Rexp = 0.002 + 0.819 * Rm$$

under the condition requiring all cases within the event window, that is event_id>=87 & event_id <= 173.

The daily abnormal returns for the same period were found by subtracting the expected daily returns from the actually observed values

$$AR = Ri - Rexp$$

Results of all calculations are available in Appendix B.

As another single-stock, single-event case, the cumulative abnormal return (CAR), as well as CAAR, over the entire event window, is equal to the sum of ARs or **-0.042288**, meaning that during the period of the event window, the average abnormal returns have been reduced by 4.23%, contrary to the 24.3%[9] increase in the stock's actual price, during the same period. Subsequently, it is necessary to assess whether there is a statistically significant relationship between the CSR event and the noteworthy increase in Google's stock price over the event window.

[9] The average change in the actual stock price over the period of the event window is equal to [GOOGLE(t_2)- GOOGLE (t_1)]/ GOOGLE (t_1), where t_1 is the first trading day and t_2 the last trading day of the event window.

First, AAR were computed for each trading day, which were equal to the abnormal returns computed earlier, since there is only one stock and one event. Then, the t-value was calculated for each AAR_t and compared to the two-tailed critical ($a = 0.05$ and $df = 86$), to assess their statistical significance.

On the date of the event (10/01/2013, event_id=130), the AAR were equal to -0.001658 with an absolute t-value of 0.175<1.988, which implied that there were no statistically significant abnormal returns. Moreover, within the event window, the values of AAR fluctuated around 0, with only three trading days, which were close to the event date, having statistically significant AAR values.

Consequently, the first statistical test showed that the CSR event did not have a statistically significant impact on the company's share performance.

The next step was to test the significance of the CAAR over the entire event window, which was equal to -0.042288. Its t-value was computed to be -1.477383. Thus, its absolute value was less than the critical value (1.988), which implied that the overall CAAR was not statistically significant. The results of the aforementioned calculations are summarized in the table below.

event_id	Date	AR_t	AAR_t	$(AAR_t - \overline{AAR})^2$	t-value (AAR_t)
87	12-Nov-	0.002472	0.002472	0.000009	0.260290
88	13-Nov-	-	-0.006550	0.000037	-0.689685
89	14-Nov-	-	-0.001334	0.000001	-0.140464
90	15-Nov-	-	-0.007303	0.000046	-0.768972
91	16-Nov-	-	-0.006784	0.000040	-0.714324
92	19-Nov-	0.012122	0.012122	0.000159	1.276391
93	20-Nov-	0.000457	0.000457	0.000001	0.048120
94	21-Nov-	-	-0.010899	0.000108	-1.147615
95	22-Nov-	-	-0.002000	0.000002	-0.210591
96	23-Nov-	-	-0.010055	0.000092	-1.058746
97	26-Nov-	-	-0.014989	0.000210	-1.578273
98	27-Nov-	0.014819	0.014819	0.000234	1.560373
99	28-Nov-	0.010556	0.010556	0.000122	1.111499
100	29-Nov-	0.004415	0.004415	0.000024	0.464879
101	30-Nov-	0.007800	0.007800	0.000069	0.821304
102	3-Dec-12	-	-0.004283	0.000014	-0.450980
103	4-Dec-12	-	-0.006578	0.000037	-0.692633
104	5-Dec-12	-	-0.000359	0.000000	-0.037801
105	6-Dec-12	-	-0.001466	0.000001	-0.154363
106	7-Dec-12	-	-0.008971	0.000072	-0.944605
107	10-Dec-12	-	-0.002699	0.000005	-0.284192
108	11-Dec-12	0.004961	0.004961	0.000030	0.522371

109	12-Dec-12	0.001278	0.001278	0.000003	0.134568
110	13-Dec-12	0.011239	0.011239	0.000137	1.183415
111	14-Dec-12	0.002669	0.002669	0.000010	0.281033
112	17-Dec-12	0.013707	0.013707	0.000201	1.443284
113	18-Dec-12	-	-0.013476	0.000169	-1.418961
114	19-Dec-12	-	-0.000600	0.000000	-0.063177
115	20-Dec-12	-	-0.000490	0.000000	-0.051595
116	21-Dec-12	-	-0.003439	0.000009	-0.362111
117	24-Dec-12	-	-0.008325	0.000061	-0.876584
118	25-Dec-12	-	-0.002000	0.000002	-0.210591
119	26-Dec-12	0.003250	0.003250	0.000014	0.342210
120	27-Dec-12	-	-0.004478	0.000016	-0.471513
121	28-Dec-12	-	-0.003899	0.000012	-0.410547
122	31-Dec-12	-	-0.007739	0.000053	-0.814881
123	1-Jan-13	-	-0.002000	0.000002	-0.210591
124	2-Jan-13	-	-0.004571	0.000017	-0.481305
125	3-Jan-13	0.001662	0.001662	0.000005	0.175001
126	4-Jan-13	0.017261	0.017261	0.000315	1.817504
127	7-Jan-13	-	-0.005616	0.000026	-0.591339
128	8-Jan-13	-	-0.002108	0.000003	-0.221963
129	9-Jan-13	0.000845	0.000845	0.000002	0.088975
130	**10-Jan-**	**-**	**-0.001658**	**0.000001**	**-0.174580**
131	11-Jan-13	-	-0.005038	0.000021	-0.530478
132	14-Jan-13	-	-0.022726	0.000495	-2.392944
133	15-Jan-13	0.002085	0.002085	0.000007	0.219541
134	16-Jan-13	-	-0.017319	0.000283	-1.823611
135	17-Jan-13	-	-0.012270	0.000139	-1.291975
136	18-Jan-13	-	-0.011259	0.000116	-1.185521
137	21-Jan-13	-	-0.002000	0.000002	-0.210591
138	22-Jan-13	-	-0.006538	0.000037	-0.688421
139	23-Jan-13	0.048764	0.048764	0.002426	5.134626
140	24-Jan-13	0.020560	0.020560	0.000443	2.164874
141	25-Jan-13	-	-0.007254	0.000046	-0.763813
142	28-Jan-13	-	-0.007097	0.000044	-0.747282
143	29-Jan-13	0.002097	0.002097	0.000007	0.220805
144	30-Jan-13	0.001138	0.001138	0.000003	0.119826
145	31-Jan-13	0.000509	0.000509	0.000001	0.053595
146	1-Feb-13	0.014440	0.014440	0.000223	1.520466
147	4-Feb-13	-	-0.011172	0.000114	-1.176360
148	5-Feb-13	-	-0.003696	0.000010	-0.389172
149	6-Feb-13	0.004577	0.004577	0.000026	0.481937
150	7-Feb-13	0.003758	0.003758	0.000018	0.395700
151	8-Feb-13	0.005256	0.005256	0.000033	0.553433
152	11-Feb-13	-	-0.005293	0.000023	-0.557329
153	12-Feb-13	-	-0.002784	0.000005	-0.293142
154	13-Feb-13	-	-0.001906	0.000002	-0.200693
155	14-Feb-13	0.003854	0.003854	0.000019	0.405809
156	15-Feb-13	0.006121	0.006121	0.000044	0.644513
157	18-Feb-13	-	-0.002000	0.000002	-0.210591
158	19-Feb-13	0.009948	0.009948	0.000109	1.047479
159	20-Feb-13	-	-0.007385	0.000048	-0.777607
160	21-Feb-13	0.010440	0.010440	0.000119	1.099284
161	22-Feb-13	-	-0.004659	0.000017	-0.490571
162	25-Feb-13	-	-0.001341	0.000001	-0.141201
163	26-Feb-13	-	-0.006323	0.000034	-0.665783
164	27-Feb-13	0.001650	0.001650	0.000005	0.173737
165	28-Feb-13	0.000308	0.000308	0.000001	0.032431
166	1-Mar-13	0.001744	0.001744	0.000005	0.183635
167	4-Mar-13	0.013637	0.013637	0.000199	1.435914
168	5-Mar-13	0.007841	0.007841	0.000069	0.825621
169	6-Mar-13	-	-0.010215	0.000095	-1.075593

170	7-Mar-13	-	-0.003002	0.000006	-0.316097
171	8-Mar-13	-	-0.006403	0.000035	-0.674207
172	11-Mar-	-	-0.000186	0.000000	-0.019585
173	12-Mar-	-	-0.007993	0.000056	-0.841626

s	**0.009497**	
CAAR(t_1,t_2)	-0.042288	
$t_{(CAAR)}$	-0.477383	
$\lvert t_{(CAAR)} \rvert$	0.477383	< 1.988

Again, the results of the t-test performed on the time-series mean abnormal returns over the period after the event date until the end of the event window, verify the above conclusions, since the calculated t-statistic is statistically insignificant :

Count	44	
Average	-0.000200	
St.Deviation	0.011189	
St.Error	0.001687	
t-statistic	-0.11843	
|t-stat|	0.11843	<2.015 = t-critical

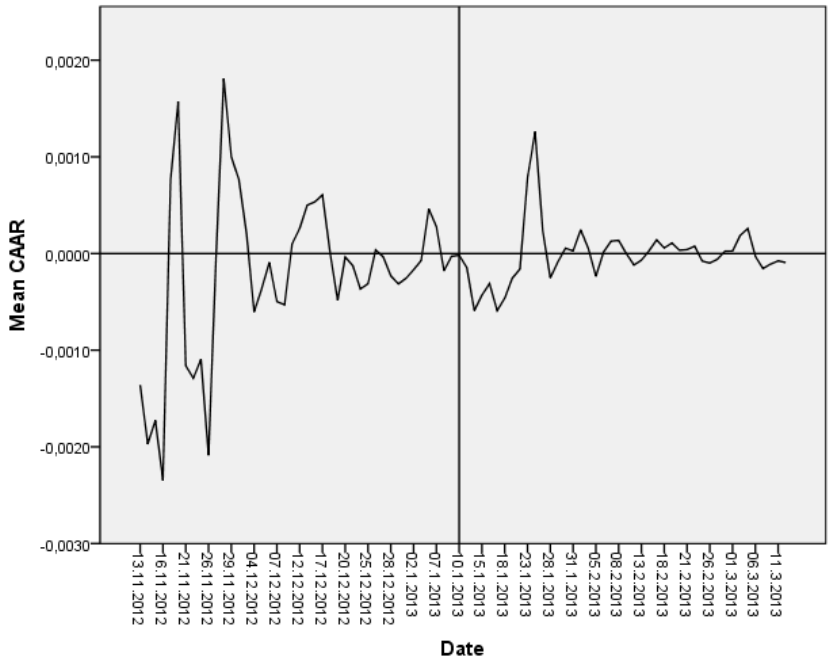
The formulas $CAR = \sum_{t=t_1}^{t_2} AR_t$ and $CAAR = \frac{1}{N}\sum_{i=1}^{N} CAR_i$ in SPSS are again applied in SPSS, and for each day CAR would be equal to the cumulative AR and CAAR would be equal to the average CAR up to that point:

$$CAR = AR + lag(AR, 1)$$

$$CAAR = CAR/(event\_id - 86 + 1)$$

where $(event\_id - 86 + 1)$ is the number of days counting from the first day of the event window.

As with previous events, the null hypothesis would require that H_0: $\overline{CAAR} = 0$ versus H_1: $\overline{CAAR} \neq 0$, where $\overline{CAAR}$ would refer to the CAAR of the entire event window.
Both the numerical results available in Appendix B and the graph below show that $\overline{CAAR}$ is approximately zero, not only around the CSR event (date = 10.01.2013, event_id=130), but throughout the entire event window.



These results would suggest that the null hypothesis should be accepted. To verify this assumption, we then perform a one-sample t-test on CAAR, with the following results :

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
CAAR	86	-,000109	,0006584	,0000710

One-Sample Test

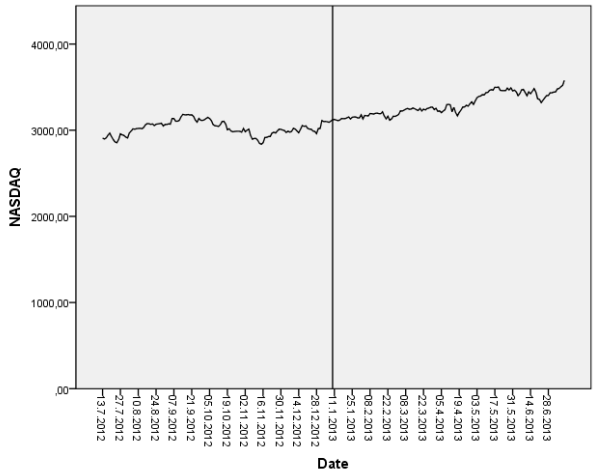
	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
CAAR	-1,533	85	,129	-,0001088	-,000250	,000032

The absolute value of the observed t is equal to 1.533 and less than 1.988, that is the two-tailed critical t. Thus, H_0 cannot be rejected, implying no statistical significance. It can be concluded, then, that the CSR event does not appear to influence Google's stock performance during the event window.

Conclusions

The event study performed on this event has showed that the CSR event involving the conflict between Google's executive chairman and North Korea has not caused a

statistically significant impact on the company's share price in the event window. This may also be verified by the historical data demonstrating an uninterrupted upward trend in the company's actual share price, which follows the trend of market index.



Due to the existing upward trend such an event could not make an easily traceable impact. Since the company's share performance is already positive, in a market which also shows a slightly upward trend, any reactions towards the CSR event (whether positive, involving recognition from the people who fight for freedom of internet use, or negative, from the US government which does not favor such initiatives or from authoritarian regimes that discourage free internet access) would have to be extremely intense to significantly affect Google's financial performance.

Chapter 5
Study Conclusions

This thesis has applied several variations of the event study methodology to examine the impact of CSR events on the financial performance of certain companies or financial institutions in five cases, four of which were single-event single-stock, while one involved multiple events and multiple stocks.

In most cases, the results of the study were consistent to the actual historical data concerning both the firms and the market environment. There have been a few issues of insufficient evidence to support the expected outcome, which led to inconclusive or contradicting results. For instance, in the first case of the Deepwater Accident, BP' s share price faces a dramatic fall during the event window, which could possibly be related to the accident, although the market index also shows a downward trend at the time. However, this abrupt fall was statistically verified by only one of the tests performed in that case, the t-test focusing on the period right after the occurrence of the event. None of the other statistical tests performed could prove such relationship, by rejecting the null hypothesis. This could be caused by the limited estimation window. Therefore, the quality of the study could be improved by using a broader estimation window to generate a more efficient regression model, with better regression statistics, such as R, R^2 and adjusted-R^2 that would avoid heteroscedasticity issues. In other words, since the results of the entire study rely on the estimated parameters of the market model, a more accurate estimation of these parameters would ultimately lead to an overall increase of accuracy.

In general, other studies have used wider estimation windows and narrower event windows. Thus, it would be interesting to reassess the same cases using various estimation and event windows to determine the quality of the results and, possibly, reach useful conclusions on the optimal window lengths. On the other hand, since this study has mostly dealt with single-event/single-stock cases, it would be useful to examine different combinations, such as single-event/multiple-stock, multiple-event/single-stock or multiple-event/multiple-stock cases.

Appendix A: Market Model OLS Estimation

Event 1 : Deepwater Horizon accident in the Gulf of Mexico

Regression

Descriptive Statistics[a]

	Mean	Std. Deviation	N
Ri	-,000905	,0131210	35
Rm	-,000407	,0124637	35

a. Selecting only cases for which event_id <= 36

Correlations[a]

		Ri	Rm
Pearson Correlation	Ri	1,000	,355
	Rm	,355	1,000
Sig. (1-tailed)	Ri	.	,018
	Rm	,018	.
N	Ri	35	35
	Rm	35	35

a. Selecting only cases for which event_id <= 36

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	Rm[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Ri

c. Models are based only on cases for which event_id <= 36

Model Summary[b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson Statistic	
	event_id <= 36 (Selected)	event_id > 36 (Unselected)				R Square Change	F Change	df1	df2	Sig. F Change	event_id <= 36 (Selected)	event_id > 36 (Unselected)
1	,355[a]	,203	,126	,099	,0124527	,126	4,747	1	33	,037	2,429	2,059

a. Predictors: (Constant), Rm

b. Unless noted otherwise, statistics are based only on cases for which event_id <= 36.

c. Dependent Variable: Ri

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,001	1	,001	4,747	,037[a]
	Residual	,005	33	,000		
	Total	,006	34			

a. Predictors: (Constant), Rm

b. Dependent Variable: Ri

c. Selecting only cases for which event_id <= 36

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-,001	,002		-,357	,723	-,005	,004					
	Rm	,373	,171	,355	2,179	,037	,025	,722	,355	,355	,355	1,000	1,000

a. Dependent Variable: Ri

b. Selecting only cases for which event_id <= 36

Coefficient Correlations[a,b]

Model			Rm
1	Correlations	Rm	1,000
	Covariances	Rm	,029

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,001	1	,001	4,747	,037[a]
	Residual	,005	33	,000		
	Total	,006	34			

a. Selecting only cases for which event_id <= 36

b. Dependent Variable: Ri

Collinearity Diagnostics[a,b]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Rm
1	1	1,033	1,000	,48	,48
	2	,967	1,034	,52	,52

a. Dependent Variable: Ri

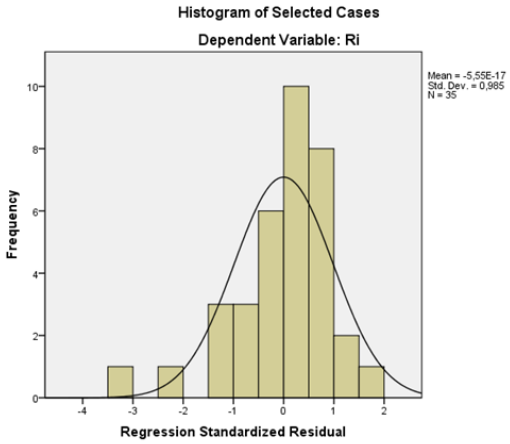
b. Selecting only cases for which event_id <= 36

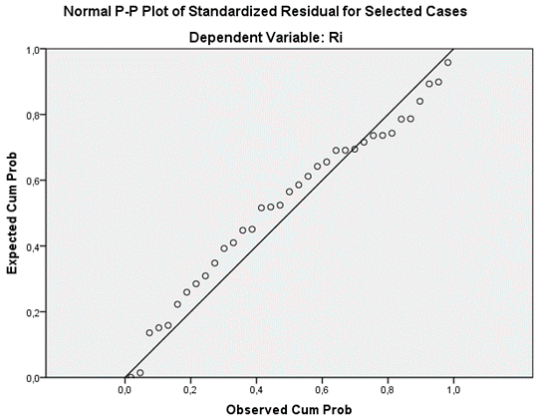
Residuals Statistics[a,b]

	event_id <= 36 (Selected)					event_id > 36 (Unselected)				
	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-,014508	,006710	-,000905	,0046531	35	-,015831	,017238	-,000558	,0045797	225
Residual	-,0429300	,0215173	,0000000	,0122682	35	-,1323741	,0910205	-,0004288	,0235255	225
Std. Predicted Value	-2,923	1,636	,000	1,000	35	-3,208	3,899	,074	,984	225
Std. Residual	-3,447	1,728	,000	,985	35	-10,630	7,309	-,034	1,889	225

a. Dependent Variable: Ri

b. Pooled Cases


Histogram of Selected Cases
Dependent Variable: Ri
Mean = -5,55E-17
Std. Dev. = 0,985
N = 35
Frequency
Regression Standardized Residual


Normal P-P Plot of Standardized Residual for Selected Cases
Dependent Variable: Ri
Expected Cum Prob
Observed Cum Prob

Event 2 : ExxonMobil Oil Spill

Descriptive Statistics[a]

	Mean	Std. Deviation	N
Ri	-,000031	,0117005	86
Rm	,000577	,0063107	86

a. Selecting only cases for which event_id <= 87

Correlations[a]

		Ri	Rm
Pearson Correlation	Ri	1,000	,780
	Rm	,780	1,000
Sig. (1-tailed)	Ri	.	,000
	Rm	,000	.
N	Ri	86	86
	Rm	86	86

a. Selecting only cases for which event_id <= 87

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	Rm[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: Ri
c. Models are based only on cases for which event_id <= 87

Model Summary[b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson Statistic	
	event_id <= 87 (Selected)	event_id > 87 (Unselected)				R Square Change	F Change	df1	df2	Sig. F Change	event_id <= 87 (Selected)	event_id > 87 (Unselected)
1	,780[a]	,638	,608	,603	,0073684	,608	130,327	1	84	,000	2,209	1,699

a. Predictors: (Constant), Rm
b. Unless noted otherwise, statistics are based only on cases for which event_id <= 87.
c. Dependent Variable: Ri

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,007	1	,007	130,327	,000[a]
	Residual	,005	84	,000		
	Total	,012	85			

a. Predictors: (Constant), Rm
b. Dependent Variable: Ri
c. Selecting only cases for which event_id <= 87

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-,001	,001		-1,084	,281	-,002	,001					
	Rm	1,446	,127	,780	11,416	,000	1,194	1,698	,780	,780	,780	1,000	1,000

a. Dependent Variable: Ri
b. Selecting only cases for which event_id <= 87

Collinearity Diagnostics[a,b]

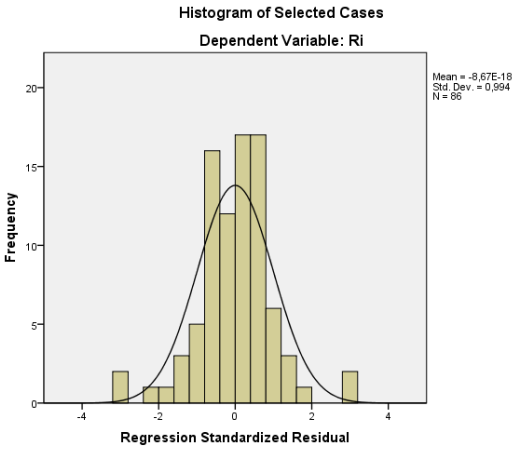
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Rm
1	1	1,092	1,000	,45	,45
	2	,908	1,096	,55	,55

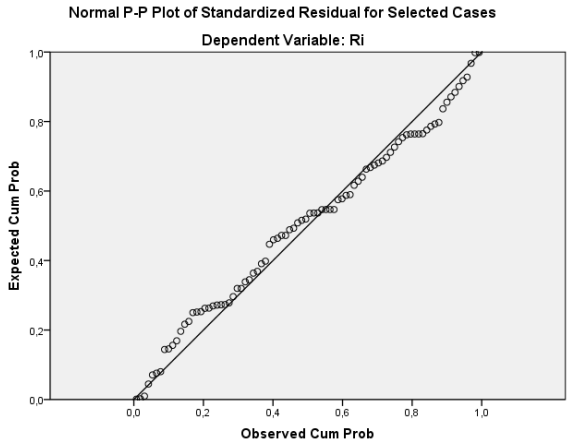
a. Dependent Variable: Ri
b. Selecting only cases for which event_id <= 87

Residuals Statistics[a,b]

	event_id <= 87 (Selected)					event_id > 87 (Unselected)				
	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-,027860	,025942	-,000031	,0091239	86	-,030755	,027646	,000675	,0091832	174
Residual	-,0224903	,0226783	,0000000	,0073249	86	-,0261611	,0213063	-,0005981	,0086763	174
Std. Predicted Value	-3,050	2,847	,000	1,000	86	-3,367	3,033	,077	1,006	174
Std. Residual	-3,052	3,078	,000	,994	86	-3,550	2,892	-,081	1,177	174

a. Dependent Variable: Ri
b. Pooled Cases





Event 3 : HSBC Settlement on Money-Laundering Scandal

Descriptive Statistics[a]

	Mean	Std. Deviation	N
Ri	,001862	,0135960	88
Rm	,001164	,0085643	88

a. Selecting only cases for which event_id <= 89

Correlations[a]

		Ri	Rm
Pearson Correlation	Ri	1,000	,859
	Rm	,859	1,000
Sig. (1-tailed)	Ri	.	,000
	Rm	,000	.
N	Ri	88	88
	Rm	88	88

a. Selecting only cases for which event_id <= 89

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	Rm[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: Ri
c. Models are based only on cases for which event_id <= 89

Model Summary[b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson Statistic	
	event_id <= 89 (Selected)	event_id > 89 (Unselected)				R Square Change	F Change	df1	df2	Sig. F Change	event_id <= 89 (Selected)	event_id > 89 (Unselected)
1	,859[a]	,809	,738	,735	,0069968	,738	242,502	1	86	,000	1,784	2,314

a. Predictors: (Constant), Rm
b. Unless noted otherwise, statistics are based only on cases for which event_id <= 89.
c. Dependent Variable: Ri

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,012	1	,012	242,502	,000[a]
	Residual	,004	86	,000		
	Total	,016	87			

a. Predictors: (Constant), Rm
b. Dependent Variable: Ri
c. Selecting only cases for which event_id <= 89

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	,000	,001		,364	,717	-,001	,002					
	Rm	1,364	,088	,859	15,572	,000	1,190	1,538	,859	,859	,859	1,000	1,000

a. Dependent Variable: Ri
b. Selecting only cases for which event_id <= 89

Collinearity Diagnostics[a,b]

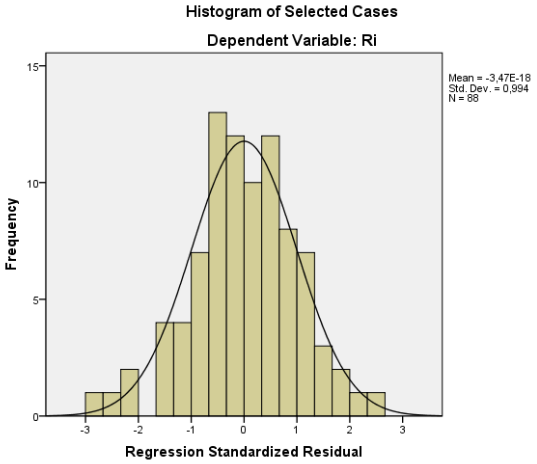
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Rm
1	1	1,135	1,000	,43	,43
	2	,865	1,146	,57	,57

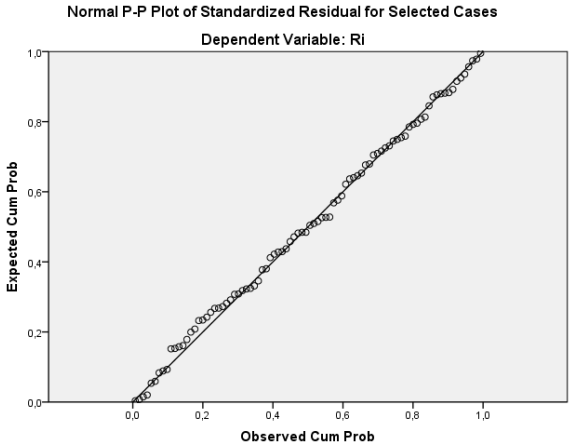
a. Dependent Variable: Ri
b. Selecting only cases for which event_id <= 89

Residuals Statistics[a,b]

	event_id <= 89 (Selected)					event_id > 89 (Unselected)				
	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-,028481	,032034	,001862	,0116815	88	-,028641	,032037	,001170	,0097815	172
Residual	-,0188009	,0182221	,0000000	,0069565	88	-,0192028	,0213782	-,0000537	,0065689	172
Std. Predicted Value	-2,598	2,583	,000	1,000	88	-2,611	2,583	-,059	,837	172
Std. Residual	-2,687	2,604	,000	,994	88	-2,745	3,055	-,008	,939	172

a. Dependent Variable: Ri
b. Pooled Cases





Event 4 : Libor Scandal

Event 4a : Barclays Settlement

Descriptive Statistics[a]

	Mean	Std. Deviation	N
Ri1	,005837	,0260227	61
Rm1	,000852	,0078414	61

a. Selecting only cases for which event_id <= 62

Correlations[a]

		Ri1	Rm1
Pearson Correlation	Ri1	1,000	,635
	Rm1	,635	1,000
Sig. (1-tailed)	Ri1	.	,000
	Rm1	,000	.
N	Ri1	61	61
	Rm1	61	61

a. Selecting only cases for which event_id <= 62

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	Rm1[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: Ri1
c. Models are based only on cases for which event_id <= 62

Model Summary[b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson Statistic	
	event_id <= 62 (Selected)	event_id > 62 (Unselected)				R Square Change	F Change	df1	df2	Sig. F Change	event_id <= 62 (Selected)	event_id > 62 (Unselected)
1	,635[a]	,708	,403	,393	,0202795	,403	39,796	1	59	,000	1,963	1,709

a. Predictors: (Constant), Rm1
b. Unless noted otherwise, statistics are based only on cases for which event_id <= 62.
c. Dependent Variable: Ri1

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,016	1	,016	39,796	,000[a]
	Residual	,024	59	,000		
	Total	,041	60			

a. Predictors: (Constant), Rm1
b. Dependent Variable: Ri1
c. Selecting only cases for which event_id <= 62

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	,004	,003		1,547	,127	-,001	,009					
	Rm1	2,106	,334	,635	6,308	,000	1,438	2,774	,635	,635	,635	1,000	1,000

a. Dependent Variable: Ri1
b. Selecting only cases for which event_id <= 62

Collinearity Diagnostics[a,b]

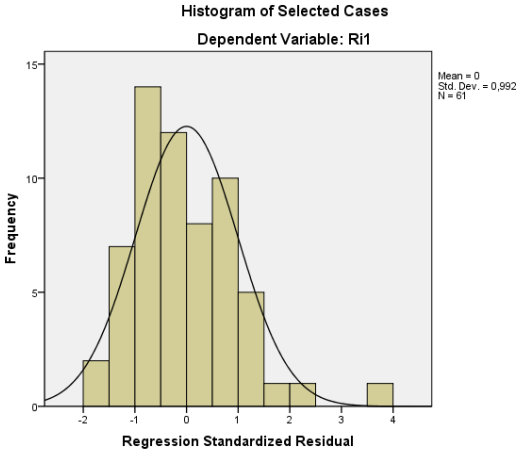
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Rm1
1	1	1,109	1,000	,45	,45
	2	,891	1,116	,55	,55

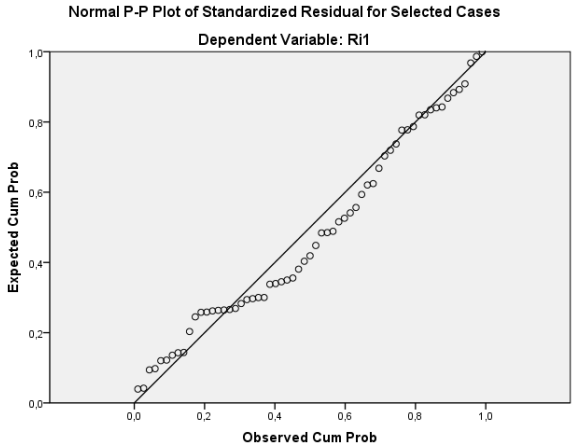
a. Dependent Variable: Ri1
b. Selecting only cases for which event_id <= 62

Residuals Statistics[a,b]

	event_id <= 62 (Selected)					event_id > 62 (Unselected)				
	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-,035411	,051740	,005837	,0165159	61	-,049999	,053091	,004197	,0189384	195
Residual	-,0356115	,0775944	,0000000	,0201098	61	-,1610498	,0592816	-,0039623	,0200455	195
Std. Predicted Value	-2,497	2,779	,000	1,000	61	-3,381	2,861	-,099	1,147	195
Std. Residual	-1,756	3,826	,000	,992	61	-7,942	2,923	-,195	,988	195

a. Dependent Variable: Ri1
b. Pooled Cases





Event 4b : RBS Fine

Descriptive Statistics[a]

	Mean	Std. Deviation	N
Ri2	,003461	,0206621	85
Rm2	,000135	,0074274	85

a. Selecting only cases for which event_id <= 86

Correlations[a]

		Ri2	Rm2
Pearson Correlation	Ri2	1,000	,631
	Rm2	,631	1,000
Sig. (1-tailed)	Ri2	.	,000
	Rm2	,000	.
N	Ri2	85	85
	Rm2	85	85

a. Selecting only cases for which event_id <= 86

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	Rm2[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: Ri2
c. Models are based only on cases for which event_id <= 86

Model Summary[b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson Statistic	
	event_id <= 86 (Selected)	event_id > 86 (Unselected)				R Square Change	F Change	df1	df2	Sig. F Change	event_id <= 86 (Selected)	event_id > 86 (Unselected)
1	,631[a]	,516	,399	,391	,0161204	,399	54,999	1	83	,000	1,424	1,849

a. Predictors: (Constant), Rm2
b. Unless noted otherwise, statistics are based only on cases for which event_id <= 86.
c. Dependent Variable: Ri2

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,014	1	,014	54,999	,000[a]
	Residual	,022	83	,000		
	Total	,036	84			

a. Predictors: (Constant), Rm2
b. Dependent Variable: Ri2
c. Selecting only cases for which event_id <= 86

Collinearity Diagnostics[a,b]

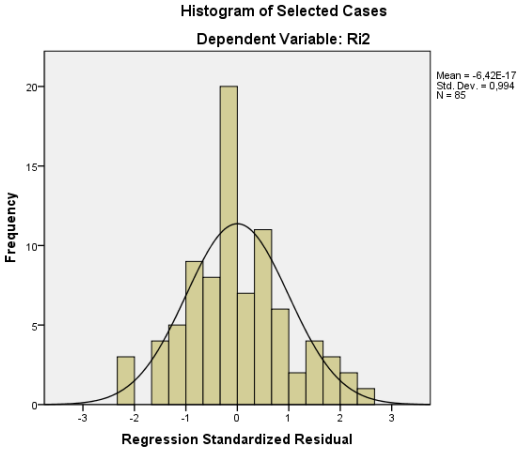
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Rm2
1	1	1,018	1,000	,49	,49
	2	,982	1,018	,51	,51

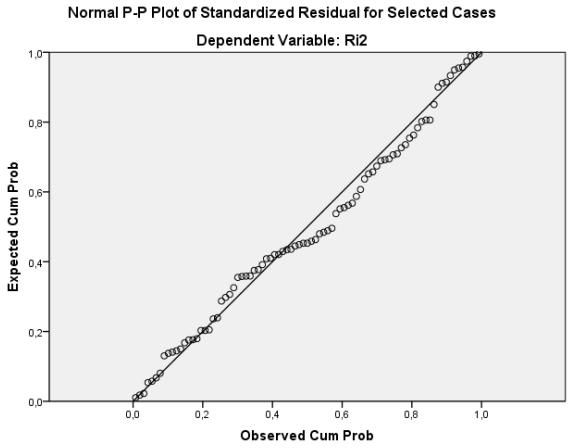
a. Dependent Variable: Ri2
b. Selecting only cases for which event_id <= 86

Residuals Statistics[a,b]

	event_id <= 86 (Selected)					event_id > 86 (Unselected)				
	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-,024833	,044122	,003461	,0130441	85	-,049939	,056478	,004200	,0140753	173
Residual	-,0371827	,0422894	,0000000	,0160242	85	-,0812085	,0453645	-,0037917	,0203405	173
Std. Predicted Value	-2,169	3,117	,000	1,000	85	-4,094	4,064	,057	1,079	173
Std. Residual	-2,307	2,623	,000	,994	85	-5,038	2,814	-,235	1,262	173

a. Dependent Variable: Ri2
b. Pooled Cases





Event 4c : UBS Conviction

Descriptive Statistics[a]

	Mean	Std. Deviation	N
Ri3	,001336	,0186046	85
Rm3	-,000383	,0103895	85

a. Selecting only cases for which event_id <= 86

Correlations[a]

		Ri3	Rm3
Pearson Correlation	Ri3	1,000	,463
	Rm3	,463	1,000
Sig. (1-tailed)	Ri3	.	,000
	Rm3	,000	.
N	Ri3	85	85
	Rm3	85	85

a. Selecting only cases for which event_id <= 86

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	Rm3[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: Ri3
c. Models are based only on cases for which event_id <= 86

Model Summary[b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson Statistic	
	event_id <= 86 (Selected)	event_id > 86 (Unselected)				R Square Change	F Change	df1	df2	Sig. F Change	event_id <= 86 (Selected)	event_id > 86 (Unselected)
1	,463[a]	,105	,214	,205	,0165910	,214	22,627	1	83	,000	1,528	2,129

a. Predictors: (Constant), Rm3
b. Unless noted otherwise, statistics are based only on cases for which event_id <= 86.
c. Dependent Variable: Ri3

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,006	1	,006	22,627	,000[a]
	Residual	,023	83	,000		
	Total	,029	84			

a. Predictors: (Constant), Rm3
b. Dependent Variable: Ri3
c. Selecting only cases for which event_id <= 86

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	,002	,002		,918	,361	-,002	,005					
	Rm3	,829	,174	,463	4,757	,000	,482	1,175	,463	,463	,463	1,000	1,000

a. Dependent Variable: Ri3
b. Selecting only cases for which event_id <= 86

Collinearity Diagnostics[a,b]

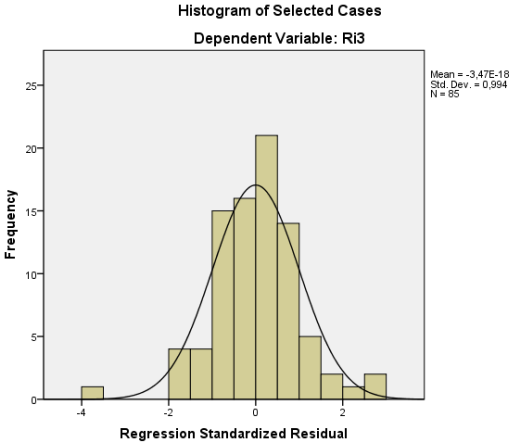
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Rm3
1	1	1,037	1,000	,48	,48
	2	,963	1,038	,52	,52

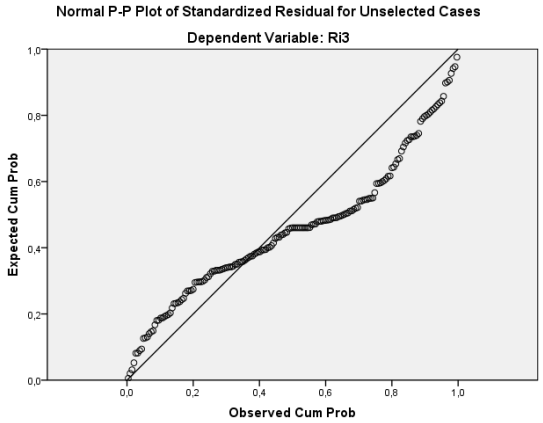
a. Dependent Variable: Ri3
b. Selecting only cases for which event_id <= 86

Residuals Statistics[a,b]

	event_id <= 86 (Selected)					event_id > 86 (Unselected)				
	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-,019096	,023648	,001336	,0086108	85	-,015833	,020013	,002248	,0062450	173
Residual	-,0631676	,0447377	,0000000	,0164920	85	-,0423281	,0326827	-,0020872	,0113261	173
Std. Predicted Value	-2,373	2,591	,000	1,000	85	-1,994	2,169	,106	,725	173
Std. Residual	-3,807	2,697	,000	,994	85	-2,551	1,970	-,126	,683	173

a. Dependent Variable: Ri3
b. Pooled Cases





Event 5 : Google & North Korea

Descriptive Statistics[a]

	Mean	Std. Deviation	N
Ri	,001645	,0144477	85
Rm	-,000015	,0086179	85

a. Selecting only cases for which event_id <= 86

Correlations[a]

		Ri	Rm
Pearson Correlation	Ri	1,000	,489
	Rm	,489	1,000
Sig. (1-tailed)	Ri	.	,000
	Rm	,000	.
N	Ri	85	85
	Rm	85	85

a. Selecting only cases for which event_id <= 86

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	Rm[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: Ri
c. Models are based only on cases for which event_id <= 86

Model Summary[b,c]

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson Statistic	
	event_id <= 86 (Selected)	event_id > 86 (Unselected)				R Square Change	F Change	df1	df2	Sig. F Change	event_id <= 86 (Selected)	event_id > 86 (Unselected)
1	,489[a]	,621	,239	,229	,0126820	,239	26,018	1	83	,000	1,895	1,848

a. Predictors: (Constant), Rm
b. Unless noted otherwise, statistics are based only on cases for which event_id <= 86.
c. Dependent Variable: Ri

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,004	1	,004	26,018	,000[a]
	Residual	,013	83	,000		
	Total	,018	84			

a. Predictors: (Constant), Rm
b. Dependent Variable: Ri
c. Selecting only cases for which event_id <= 86

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	,002	,001		1,205	,232	-,001	,004					
	Rm	,819	,161	,489	5,101	,000	,500	1,138	,489	,489	,489	1,000	1,000

a. Dependent Variable: Ri
b. Selecting only cases for which event_id <= 86

Collinearity Diagnostics[a,b]

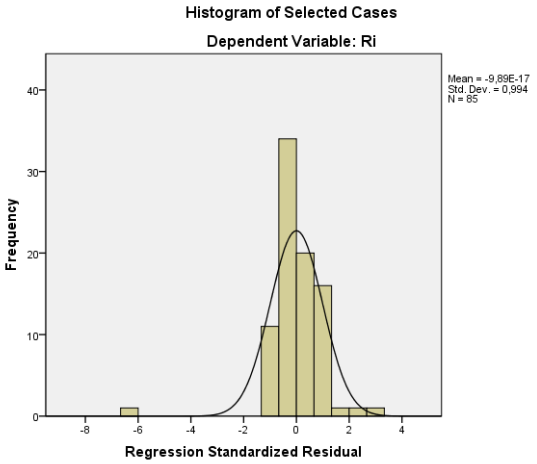
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Rm
1	1	1,002	1,000	,50	,50
	2	,998	1,002	,50	,50

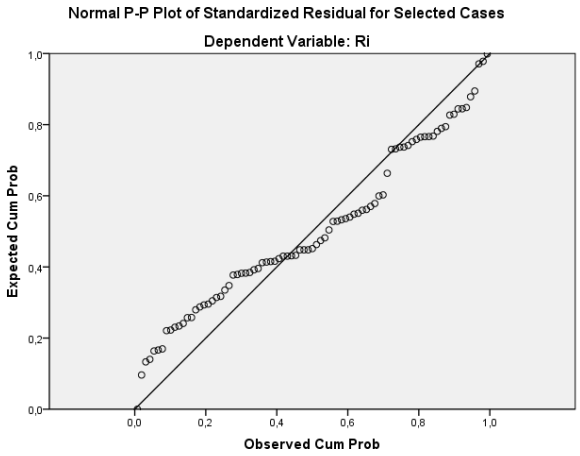
a. Dependent Variable: Ri
b. Selecting only cases for which event_id <= 86

Residuals Statistics[a,b]

	event_id <= 86 (Selected)					event_id > 86 (Unselected)				
	Minimum	Maximum	Mean	Std. Deviation	N	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-,018895	,019809	,001645	,0070581	85	-,018081	,026436	,002638	,0066324	174
Residual	-,0768125	,0391429	,0000000	,0126063	85	-,0223833	,0491069	-,0007543	,0090800	174
Std. Predicted Value	-2,910	2,573	,000	1,000	85	-2,795	3,512	,141	,940	174
Std. Residual	-6,057	3,086	,000	,994	85	-1,765	3,872	-,059	,716	174

a. Dependent Variable: Ri
b. Pooled Cases





Appendix B : Calculations

Event 1 : Deepwater Horizon accident in the Gulf of Mexico

event_id	Date	BPPlc	NYSECOMPOSITE	Ri	Rm	Rexp	AR	CAR	CAAR
1	01/01/10	600	7184.96						
2	04/01/10	613.6	7326.74	0.022414	0.019541				
3	05/01/10	620.1	7354.87	0.010538	0.003832				
4	06/01/10	619.4	7377.7	-0.001129	0.003099				
5	07/01/10	623.3	7393.93	0.006277	0.002197				
6	08/01/10	621.7	7425.35	-0.00257	0.00424				
7	11/01/10	635.5	7449.05	0.021954	0.003187				
8	12/01/10	633.8	7370.45	-0.002679	-0.010608				
9	13/01/10	626.6	7430.14	-0.011425	0.008066				
10	14/01/10	628.4	7448.52	0.002869	0.002471				
11	15/01/10	629	7356.79	0.000954	-0.012392				
12	18/01/10	629	7356.79	0	0				
13	19/01/10	629.5	7443.68	0.000795	0.011742				
14	20/01/10	619.5	7329.83	-0.016013	-0.015413				
15	21/01/10	610.3	7174.46	-0.014962	-0.021425				
16	22/01/10	605.6	7030.61	-0.007731	-0.020254				
17	25/01/10	599	7073.13	-0.010958	0.00603				
18	26/01/10	602	7028.32	0.004996	-0.006355				
19	27/01/10	594.1	7035.61	-0.01321	0.001037				
20	28/01/10	587	6956.99	-0.012023	-0.011237				
21	29/01/10	586.9	6883.78	-0.00017	-0.010579				
22	01/02/10	594.6	7008.23	0.013034	0.017917				
23	02/02/10	572	7101.44	-0.03875	0.013212				
24	03/02/10	574.3	7042.62	0.004013	-0.008317				
25	04/02/10	565.1	6787.86	-0.016149	-0.036845				
26	05/02/10	560	6782.75	-0.009066	-0.000753				
27	08/02/10	563	6713.87	0.005343	-0.010207				
28	09/02/10	563.6	6835.16	0.001065	0.017904				
29	10/02/10	569.7	6819.12	0.010765	-0.002349				
30	11/02/10	574.6	6898.72	0.008564	0.011605				
31	12/02/10	573.7	6874.56	-0.001568	-0.003508				
32	15/02/10	575.3	6874.56	0.002785	0				
33	16/02/10	588.2	7013.35	0.022175	0.019988				
34	17/02/10	572.6	7035.2	-0.02688	0.003111				
35	18/02/10	577.1	7080.38	0.007828	0.006401				
36	19/02/10	581.3	7083.25	0.007251	0.000405				
37	22/02/10	581.2	7078.53	-0.000172	-0.000667	-0.001249	0.001077		

38	23/02/10	572.9	6974.6	-0.014384	-0.014791	-0.006517	-0.007867	-0.00679	-0.003395
39	24/02/10	576.3	7030.67	0.005917	0.008007	0.001987	0.003931	-0.003936	-0.001312
40	25/02/10	567.4	7013.45	-0.015564	-0.002452	-0.001915	-0.013649	-0.009719	-0.00243
41	26/02/10	578.7	7035.04	0.01972	0.003074	0.000146	0.019573	0.005924	0.001185
42	01/03/10	596	7100.75	0.029456	0.009297	0.002468	0.026989	0.046562	0.00776
43	02/03/10	600.2	7135.97	0.007022	0.004948	0.000846	0.006177	0.033165	0.004738
44	03/03/10	604.1	7164.66	0.006477	0.004012	0.000497	0.00598	0.012157	0.00152
45	04/03/10	606.7	7173.07	0.004295	0.001173	-0.000562	0.004857	0.010837	0.001204
46	05/03/10	612	7291.31	0.008698	0.016349	0.005098	0.003599	0.008457	0.000846
47	08/03/10	616.2	7292.53	0.006839	0.000167	-0.000938	0.007777	0.011376	0.001034
48	09/03/10	619.6	7294.02	0.005503	0.000204	-0.000924	0.006426	0.014203	0.001184
49	10/03/10	624.9	7327.67	0.008518	0.004603	0.000717	0.007801	0.014227	0.001094
50	11/03/10	623.7	7353.24	-0.001922	0.003483	0.000299	-0.002221	0.005579	0.000399
51	12/03/10	619.9	7362.85	-0.006111	0.001306	-0.000513	-0.005598	-0.00782	-0.000521
52	15/03/10	619.3	7350.96	-0.000968	-0.001616	-0.001603	0.000634	-0.004964	-0.00031
53	16/03/10	622.4	7426.7	0.004993	0.010251	0.002824	0.00217	0.002804	0.000165
54	17/03/10	630.7	7474.13	0.013247	0.006366	0.001375	0.011873	0.014042	0.00078
55	18/03/10	633	7443.57	0.00364	-0.004097	-0.002528	0.006168	0.018041	0.00095
56	19/03/10	635.1	7386.85	0.003312	-0.007649	-0.003853	0.007165	0.013334	0.000667
57	22/03/10	629.8	7419.02	-0.00838	0.004346	0.000621	-0.009001	-0.001836	-0.000087
58	23/03/10	634.6	7478.76	0.007593	0.00802	0.001991	0.005601	-0.0034	-0.000155
59	24/03/10	637.2	7408.16	0.004089	-0.009485	-0.004538	0.008627	0.014228	0.000619
60	25/03/10	635	7385.6	-0.003459	-0.00305	-0.002138	-0.001321	0.007306	0.000304
61	26/03/10	631.6	7403.58	-0.005369	0.002432	-0.000093	-0.005276	-0.006597	-0.000264
62	29/03/10	628.2	7464.9	-0.005398	0.008248	0.002077	-0.007474	-0.01275	-0.00049
63	30/03/10	624	7460.72	-0.006708	-0.00056	-0.001209	-0.005499	-0.012974	-0.000481
64	31/03/10	623.4	7447.8	-0.000962	-0.001733	-0.001646	0.000684	-0.004815	-0.000172
65	01/04/10	631.3	7539.02	0.012593	0.012174	0.003541	0.009052	0.009737	0.000336
66	02/04/10	631.3	7539.02	0	0	-0.001	0.001	0.010052	0.000335
67	05/04/10	631.3	7600.93	0	0.008178	0.002051	-0.002051	-0.001051	-0.000034
68	06/04/10	646.3	7604.44	0.023483	0.000462	-0.000828	0.02431	0.02226	0.000696
69	07/04/10	642.3	7546.18	-0.006208	-0.007691	-0.003869	-0.00234	0.021971	0.000666
70	08/04/10	637.1	7565.33	-0.008129	0.002534	-0.000055	-0.008074	-0.010414	-0.000306
71	09/04/10	641.1	7629.05	0.006259	0.008387	0.002128	0.00413	-0.003944	-0.000113
72	12/04/10	641.1	7641.75	0	0.001663	-0.00038	0.00038	0.00451	0.000125
73	13/04/10	640.7	7638.35	-0.000624	-0.000445	-0.001166	0.000542	0.000921	0.000025
74	14/04/10	643.1	7728.96	0.003739	0.011793	0.003399	0.00034	0.000882	0.000023
75	15/04/10	653	7719.66	0.015277	-0.001204	-0.001449	0.016726	0.017066	0.000438
76	16/04/10	641.8	7584.62	-0.0173	-0.017648	-0.007583	-0.009718	0.007008	0.000175
77	19/04/10	642.5	7596.56	0.00109	0.001573	-0.000413	0.001503	-0.008214	-0.0002
78	20/04/10	655.4	7669.11	0.019879	0.009505	0.002545	0.017334	0.018837	0.000448
79	21/04/10	648.2	7644.67	-0.011046	-0.003192	-0.002191	-0.008856	0.008478	0.000197
80	22/04/10	636.4	7642.83	-0.018372	-0.000241	-0.00109	-0.017282	-0.026138	-0.000594
81	23/04/10	639.7	7701.61	0.005172	0.007661	0.001858	0.003314	-0.013968	-0.00031

82	26/04/10	626.8	7677.65	-0.020372	-0.003116	-0.002162	-0.01821	-0.014895	-0.000324
83	27/04/10	610	7463.09	-0.027169	-0.028344	-0.011572	-0.015596	-0.033806	-0.000719
84	28/04/10	625	7499.72	0.024293	0.004896	0.000826	0.023466	0.00787	0.000164
85	29/04/10	584.2	7589.29	-0.067508	0.011872	0.003428	-0.070937	-0.04747	-0.000969
86	30/04/10	575.5	7474.4	-0.015004	-0.015254	-0.00669	-0.008314	-0.079251	-0.001585
87	03/05/10	575.5	7543.12	0	0.009152	0.002414	-0.002414	-0.010728	-0.00021
88	04/05/10	558.5	7337.25	-0.029985	-0.027672	-0.011322	-0.018663	-0.021077	-0.000405
89	05/05/10	565	7257.97	0.011571	-0.010864	-0.005052	0.016623	-0.00204	-0.000038
90	06/05/10	567	7011.92	0.003534	-0.034489	-0.013864	0.017398	0.034021	0.00063
91	07/05/10	553.9	6916.18	-0.023375	-0.013748	-0.006128	-0.017247	0.000151	0.000003
92	10/05/10	549.2	7257.62	-0.008521	0.048188	0.016974	-0.025496	-0.042743	-0.000763
93	11/05/10	545.5	7221.66	-0.00676	-0.004967	-0.002853	-0.003907	-0.029403	-0.000516
94	12/05/10	541.6	7316.36	-0.007175	0.013028	0.003859	-0.011035	-0.014942	-0.000258
95	13/05/10	547.6	7234.37	0.011017	-0.01127	-0.005204	0.016221	0.005186	0.000088
96	14/05/10	530.2	7077.64	-0.032291	-0.021903	-0.00917	-0.023121	-0.0069	-0.000115
97	17/05/10	529.9	7063.83	-0.000566	-0.001953	-0.001729	0.001163	-0.021959	-0.00036
98	18/05/10	534	6959.21	0.007708	-0.014921	-0.006566	0.014273	0.015436	0.000249
99	19/05/10	523.5	6927.21	-0.019859	-0.004609	-0.002719	-0.01714	-0.002866	-0.000045
100	20/05/10	528.8	6653	0.010073	-0.040389	-0.016065	0.026138	0.008999	0.000141
101	21/05/10	506.7	6775.45	-0.042691	0.018238	0.005803	-0.048494	-0.022355	-0.000344
102	24/05/10	493	6666.74	-0.02741	-0.016175	-0.007033	-0.020377	-0.068871	-0.001043
103	25/05/10	485.2	6665.83	-0.015948	-0.000137	-0.001051	-0.014897	-0.035274	-0.000526
104	26/05/10	492	6631.36	0.013918	-0.005185	-0.002934	0.016851	0.001954	0.000029
105	27/05/10	520.8	6893.29	0.056887	0.038739	0.013449	0.043438	0.060289	0.000874
106	28/05/10	494.8	6791.57	-0.051212	-0.014866	-0.006545	-0.044667	-0.001229	-0.000018
107	31/05/10	494.8	6791.57	0	0	-0.001	0.001	-0.043667	-0.000615
108	01/06/10	430	6661.1	-0.140368	-0.019398	-0.008235	-0.132133	-0.131133	-0.001821
109	02/06/10	429.75	6839.61	-0.000582	0.026446	0.008864	-0.009446	-0.141579	-0.001939
110	03/06/10	432.25	6860.39	0.0058	0.003034	0.000132	0.005669	-0.003777	-0.000051
111	04/06/10	433.35	6600.27	0.002542	-0.038654	-0.015418	0.017959	0.023628	0.000315
112	07/06/10	430.3	6512.42	-0.007063	-0.013399	-0.005998	-0.001065	0.016894	0.000222
113	08/06/10	408.9	6596.12	-0.051012	0.01277	0.003763	-0.054775	-0.05584	-0.000725
114	09/06/10	391.55	6559.71	-0.043357	-0.005535	-0.003065	-0.040293	-0.095068	-0.001219
115	10/06/10	365.5	6783.51	-0.068847	0.033548	0.011514	-0.08036	-0.120653	-0.001527
116	11/06/10	391.9	6814.76	0.06974	0.004596	0.000714	0.069026	-0.011334	-0.000142
117	14/06/10	355.45	6817.97	-0.097622	0.000471	-0.000824	-0.096798	-0.027772	-0.000343
118	15/06/10	342	6989.88	-0.038574	0.024902	0.008288	-0.046862	-0.14366	-0.001752
119	16/06/10	337	6976.08	-0.014728	-0.001976	-0.001737	-0.012991	-0.059853	-0.000721
120	17/06/10	359.7	6982.04	0.065187	0.000854	-0.000681	0.065869	0.052878	0.00063
121	18/06/10	357.45	6988.24	-0.006275	0.000888	-0.000669	-0.005606	0.060263	0.000709
122	21/06/10	349.5	6978.86	-0.022492	-0.001343	-0.001501	-0.020991	-0.026597	-0.000309
123	22/06/10	334.2	6858.95	-0.044764	-0.017331				
124	23/06/10	333.5	6850.05	-0.002097	-0.001298				
125	24/06/10	325.25	6730.24	-0.025049	-0.017645				

126	25/06/10	304.6	6763.93	-0.065595	0.004993				
127	28/06/10	308.25	6736.6	0.011912	-0.004049				
128	29/06/10	302.9	6520.09	-0.017508	-0.032667				
129	30/06/10	318.9	6469.65	0.051475	-0.007766				
130	01/07/10	327.95	6462.03	0.027984	-0.001179				
131	02/07/10	322	6434.81	-0.01831	-0.004221				
132	05/07/10	333.3	6434.81	0.034491	0				
133	06/07/10	345.5	6486.12	0.03595	0.007942				
134	07/07/10	362.05	6685.78	0.04679	0.030318				
135	08/07/10	367	6755.81	0.01358	0.01042				
136	09/07/10	364.8	6808.71	-0.006013	0.0078				
137	12/07/10	398.95	6794.48	0.089487	-0.002092				
138	13/07/10	410.35	6907.78	0.028174	0.016538				
139	14/07/10	401	6903.36	-0.023049	-0.00064				
140	15/07/10	401.75	6916.81	0.001869	0.001946				
141	16/07/10	407.15	6709.51	0.013352	-0.030429				
142	19/07/10	387.85	6739.64	-0.048563	0.004481				
143	20/07/10	387.45	6820.04	-0.001032	0.011859				
144	21/07/10	399.9	6731.16	0.031628	-0.013118				
145	22/07/10	400	6901.91	0.00025	0.025051				
146	23/07/10	398.6	6965.11	-0.003506	0.009115				
147	26/07/10	416.95	7046	0.045008	0.011547				
148	27/07/10	406	7044.99	-0.026613	-0.000143				
149	28/07/10	402.5	6999.18	-0.008658	-0.006524				
150	29/07/10	413.45	6994.57	0.026841	-0.000659				
151	30/07/10	405.95	6998.99	-0.018307	0.000632				

Event 2 : ExxonMobil Oil Spill

event_id	Date	EXXONMOBIL	NYSECOMPOSITE	Ri	Rm	Rexp	AR	CAR	CAAR
1	23.09.1988	11,2200	1.611,2300						
2	26.09.1988	11,1900	1.606,7800	-0,0027	-0,0028				
3	27.09.1988	11,0600	1.603,4000	-0,0117	-0,0021				
4	28.09.1988	11,1300	1.607,5200	0,0063	0,0026				
5	29.09.1988	11,3100	1.626,0300	0,0160	0,0114				
6	30.09.1988	11,1900	1.623,8100	-0,0107	-0,0014				
7	03.10.1988	11,0900	1.620,2100	-0,0090	-0,0022				
8	04.10.1988	11,0000	1.617,0400	-0,0081	-0,0020				
9	05.10.1988	11,0600	1.624,3400	0,0054	0,0045				
10	06.10.1988	11,0900	1.627,6100	0,0027	0,0020				
11	07.10.1988	11,3800	1.658,0700	0,0258	0,0185				
12	10.10.1988	11,3800	1.659,6500	0,0000	0,0010				
13	11.10.1988	11,4100	1.657,6400	0,0026	-0,0012				
14	12.10.1988	11,2500	1.636,5000	-0,0141	-0,0128				
15	13.10.1988	11,2500	1.642,5200	0,0000	0,0037				
16	14.10.1988	11,2800	1.643,7900	0,0027	0,0008				
17	17.10.1988	11,2800	1.648,1300	0,0000	0,0026				
18	18.10.1988	11,2800	1.663,4600	0,0000	0,0093				
19	19.10.1988	11,1600	1.651,4100	-0,0107	-0,0073				
20	20.10.1988	11,3800	1.681,3300	0,0195	0,0180				
21	21.10.1988	11,5300	1.685,6600	0,0131	0,0026				
22	24.10.1988	11,3800	1.679,6400	-0,0131	-0,0036				
23	25.10.1988	11,3800	1.679,8500	0,0000	0,0001				
24	26.10.1988	11,3100	1.674,5600	-0,0062	-0,0032				
25	27.10.1988	11,0900	1.651,3000	-0,0196	-0,0140				
26	28.10.1988	11,1900	1.657,8600	0,0090	0,0040				
27	31.10.1988	11,1900	1.659,4400	0,0000	0,0010				
28	01.11.1988	11,2500	1.659,8600	0,0053	0,0003				
29	02.11.1988	11,2800	1.660,0800	0,0027	0,0001				
30	03.11.1988	11,1600	1.660,9200	-0,0107	0,0005				
31	04.11.1988	11,1600	1.646,3300	0,0000	-0,0088				
32	07.11.1988	10,9700	1.631,3200	-0,0172	-0,0092				
33	08.11.1988	11,0600	1.637,2400	0,0082	0,0036				
34	09.11.1988	11,0600	1.627,5100	0,0000	-0,0060				
35	10.11.1988	11,0300	1.629,3100	-0,0027	0,0011				
36	11.11.1988	10,6900	1.599,1700	-0,0313	-0,0187				
37	14.11.1988	10,7200	1.597,0600	0,0028	-0,0013				
38	15.11.1988	10,7200	1.600,1200	0,0000	0,0019				
39	16.11.1988	10,2500	1.575,0600	-0,0448	-0,0158				
40	17.11.1988	10,3800	1.578,0200	0,0126	0,0019				
41	18.11.1988	10,5300	1.587,9600	0,0143	0,0063				

42	21.11.1988	10,5300	1.587,1200	0,0000	-0,0005				
43	22.11.1988	10,6600	1.591,8800	0,0123	0,0030				
44	23.11.1988	10,5000	1.600,9700	-0,0151	0,0057				
45	24.11.1988	10,5000	1.600,9700	0,0000	0,0000				
46	25.11.1988	10,5000	1.592,7200	0,0000	-0,0052				
47	28.11.1988	10,6300	1.599,2800	0,0123	0,0041				
48	29.11.1988	10,7500	1.611,7500	0,0112	0,0078				
49	30.11.1988	10,8100	1.627,3000	0,0056	0,0096				
50	01.12.1988	10,7500	1.621,6900	-0,0056	-0,0035				
51	02.12.1988	10,5900	1.617,9900	-0,0150	-0,0023				
52	05.12.1988	10,7200	1.633,4300	0,0122	0,0095				
53	06.12.1988	11,0900	1.647,1800	0,0339	0,0084				
54	07.12.1988	11,0900	1.650,9800	0,0000	0,0023				
55	08.12.1988	11,0600	1.642,8400	-0,0027	-0,0049				
56	09.12.1988	11,1600	1.645,1700	0,0090	0,0014				
57	12.12.1988	11,1600	1.642,5200	0,0000	-0,0016				
58	13.12.1988	11,3800	1.641,4700	0,0195	-0,0006				
59	14.12.1988	11,2500	1.635,9700	-0,0115	-0,0034				
60	15.12.1988	11,2500	1.630,1500	0,0000	-0,0036				
61	16.12.1988	11,3800	1.640,6200	0,0115	0,0064				
62	19.12.1988	11,5300	1.653,5200	0,0131	0,0078				
63	20.12.1988	11,3800	1.646,7500	-0,0131	-0,0041				
64	21.12.1988	11,3400	1.646,6500	-0,0035	-0,0001				
65	22.12.1988	11,2500	1.644,2200	-0,0080	-0,0015				
66	23.12.1988	11,2500	1.650,1400	0,0000	0,0036				
67	26.12.1988	11,2500	1.650,1400	0,0000	0,0000				
68	27.12.1988	11,2500	1.645,0600	0,0000	-0,0031				
69	28.12.1988	11,2800	1.647,4900	0,0027	0,0015				
70	29.12.1988	11,1900	1.659,0200	-0,0080	0,0070				
71	30.12.1988	11,0000	1.652,2500	-0,0171	-0,0041				
72	02.01.1989	11,0000	1.652,2500	0,0000	0,0000				
73	03.01.1989	10,8100	1.638,7200	-0,0174	-0,0082				
74	04.01.1989	11,0000	1.660,7100	0,0174	0,0133				
75	05.01.1989	11,0900	1.665,2600	0,0081	0,0027				
76	06.01.1989	11,1300	1.670,2300	0,0036	0,0030				
77	09.01.1989	11,0900	1.672,2400	-0,0036	0,0012				
78	10.01.1989	11,0000	1.669,0600	-0,0081	-0,0019				
79	11.01.1989	11,1300	1.677,5200	0,0117	0,0051				
80	12.01.1989	11,1300	1.683,9700	0,0000	0,0038				
81	13.01.1989	11,1300	1.687,3600	0,0000	0,0020				
82	16.01.1989	11,1900	1.689,4700	0,0054	0,0013				
83	17.01.1989	11,1900	1.686,3000	0,0000	-0,0019				
84	18.01.1989	11,2800	1.702,4800	0,0080	0,0095				
85	19.01.1989	11,2500	1.705,0100	-0,0027	0,0015				
86	20.01.1989	11,2500	1.704,0600	0,0000	-0,0006				

87	23.01.1989	11,1900	1.693,1700	-0,0053	-0,0064				
88	24.01.1989	11,3100	1.712,8400	0,0107	0,0116	0,0157	-0,0050	-0,0124	-0,0041
89	25.01.1989	11,2500	1.716,4300	-0,0053	0,0021	0,0020	-0,0073	-0,0035	-0,0009
90	26.01.1989	11,4100	1.729,8600	0,0141	0,0078	0,0103	0,0039	-0,0003	-0,0001
91	27.01.1989	11,4700	1.742,3400	0,0052	0,0072	0,0094	-0,0042	-0,0056	-0,0009
92	30.01.1989	11,5000	1.748,4700	0,0026	0,0035	0,0041	-0,0015	-0,0037	-0,0005
93	31.01.1989	11,5900	1.761,9000	0,0078	0,0077	0,0101	-0,0023	-0,0077	-0,0010
94	01.02.1989	11,5000	1.760,2100	-0,0078	-0,0010	-0,0024	-0,0054	-0,0060	-0,0007
95	02.02.1989	11,4700	1.758,9400	-0,0026	-0,0007	-0,0020	-0,0006	0,0017	0,0002
96	03.02.1989	11,5000	1.760,5300	0,0026	0,0009	0,0003	0,0023	-0,0133	-0,0012
97	06.02.1989	11,2800	1.757,2500	-0,0193	-0,0019	-0,0037	-0,0156	-0,0190	-0,0016
98	07.02.1989	11,4100	1.776,6000	0,0115	0,0110	0,0148	-0,0034	-0,0083	-0,0006
99	08.02.1989	11,3100	1.773,1100	-0,0088	-0,0020	-0,0038	-0,0050	0,0122	0,0009
100	09.02.1989	11,3400	1.756,6100	0,0026	-0,0093	-0,0145	0,0172	0,0180	0,0012
101	10.02.1989	11,1300	1.734,2000	-0,0187	-0,0128	-0,0196	0,0009	0,0087	0,0005
102	13.02.1989	11,2200	1.735,6800	0,0081	0,0009	0,0002	0,0078	-0,0037	-0,0002
103	14.02.1989	11,0600	1.733,4600	-0,0144	-0,0013	-0,0029	-0,0115	-0,0046	-0,0003
104	15.02.1989	11,2500	1.746,8900	0,0170	0,0077	0,0102	0,0069	0,0026	0,0001
105	16.02.1989	11,2200	1.750,0600	-0,0027	0,0018	0,0016	-0,0043	-0,0142	-0,0007
106	17.02.1989	11,1900	1.760,0000	-0,0027	0,0057	0,0072	-0,0099	-0,0089	-0,0004
107	20.02.1989	11,1900	1.760,0000	0,0000	0,0000	-0,0010	0,0010	0,0000	0,0000
108	21.02.1989	11,1300	1.755,8700	-0,0054	-0,0023	-0,0044	-0,0010	0,0076	0,0003
109	22.02.1989	10,9700	1.729,3300	-0,0145	-0,0152	-0,0230	0,0085	0,0129	0,0005
110	23.02.1989	11,0600	1.735,0400	0,0082	0,0033	0,0038	0,0044	0,0063	0,0003
111	24.02.1989	10,8400	1.709,9800	-0,0201	-0,0145	-0,0220	0,0019	0,0101	0,0004
112	27.02.1989	10,9400	1.712,4200	0,0092	0,0014	0,0011	0,0081	0,0070	0,0003
113	28.02.1989	10,9700	1.718,1300	0,0027	0,0033	0,0038	-0,0011	-0,0016	-0,0001
114	01.03.1989	10,8800	1.710,2000	-0,0082	-0,0046	-0,0077	-0,0005	0,0011	0,0000
115	02.03.1989	11,0300	1.725,7400	0,0137	0,0090	0,0121	0,0016	-0,0008	0,0000
116	03.03.1989	11,0600	1.733,0300	0,0027	0,0042	0,0051	-0,0024	0,0120	0,0004
117	06.03.1989	11,3800	1.751,3300	0,0285	0,0105	0,0142	0,0143	0,0042	0,0001
118	07.03.1989	11,2200	1.747,6300	-0,0142	-0,0021	-0,0041	-0,0101	-0,0133	-0,0004
119	08.03.1989	11,1900	1.749,4200	-0,0027	0,0010	0,0005	-0,0032	0,0040	0,0001
120	09.03.1989	11,2500	1.748,4700	0,0053	-0,0005	-0,0018	0,0071	0,0019	0,0001
121	10.03.1989	11,1300	1.743,0800	-0,0107	-0,0031	-0,0055	-0,0053	-0,0063	-0,0002
122	13.03.1989	11,2200	1.755,2400	0,0081	0,0070	0,0091	-0,0010	0,0033	0,0001
123	14.03.1989	11,2500	1.754,5000	0,0027	-0,0004	-0,0016	0,0043	0,0103	0,0003
124	15.03.1989	11,3800	1.762,3200	0,0115	0,0044	0,0054	0,0061	0,0078	0,0002
125	16.03.1989	11,5300	1.777,4400	0,0131	0,0085	0,0114	0,0017	0,0107	0,0003
126	17.03.1989	11,2800	1.741,0700	-0,0219	-0,0207	-0,0309	0,0090	0,0101	0,0002
127	20.03.1989	11,1300	1.724,8900	-0,0134	-0,0093	-0,0145	0,0011	-0,0011	0,0000
128	21.03.1989	11,1600	1.731,9800	0,0027	0,0041	0,0049	-0,0022	0,0076	0,0002
129	22.03.1989	11,2200	1.727,8500	0,0054	-0,0024	-0,0045	0,0098	0,0096	0,0002

130	23.03.1989	11,1300	1.719,7100	-0,0081	-0,0047	-0,0078	-0,0002	0,0008	0,0000
131	24.03.1989	11,1300	1.719,7100	0,0000	0,0000	-0,0010	0,0010	-0,0040	-0,0001
132	27.03.1989	11,1300	1.726,9000	0,0000	0,0042	0,0050	-0,0050	-0,0180	-0,0004
133	28.03.1989	11,0300	1.732,8200	-0,0090	0,0034	0,0039	-0,0130	-0,0262	-0,0005
134	29.03.1989	10,9100	1.736,7400	-0,0109	0,0023	0,0023	-0,0132	-0,0161	-0,0003
135	30.03.1989	10,8800	1.738,1100	-0,0028	0,0008	0,0001	-0,0029	-0,0046	-0,0001
136	31.03.1989	10,9700	1.751,3300	0,0082	0,0076	0,0100	-0,0017	-0,0224	-0,0004
137	03.04.1989	10,8100	1.759,7900	-0,0147	0,0048	0,0060	-0,0207	-0,0155	-0,0003
138	04.04.1989	10,8100	1.754,7100	0,0000	-0,0029	-0,0052	0,0052	0,0083	0,0002
139	05.04.1989	10,8800	1.760,0000	0,0065	0,0030	0,0034	0,0031	-0,0042	-0,0001
140	06.04.1989	10,7500	1.755,4500	-0,0120	-0,0026	-0,0047	-0,0073	-0,0198	-0,0004
141	07.04.1989	10,6900	1.765,0700	-0,0056	0,0055	0,0069	-0,0125	-0,0291	-0,0005
142	10.04.1989	10,5000	1.764,6500	-0,0179	-0,0002	-0,0013	-0,0166	-0,0273	-0,0005
143	11.04.1989	10,4400	1.771,9500	-0,0057	0,0041	0,0050	-0,0107	-0,0036	-0,0001
144	12.04.1989	10,5000	1.771,5200	0,0057	-0,0002	-0,0014	0,0071	0,0167	0,0003
145	13.04.1989	10,5000	1.760,9500	0,0000	-0,0060	-0,0097	0,0097	-0,0096	-0,0002
146	14.04.1989	10,5000	1.785,8000	0,0000	0,0140	0,0193	-0,0193	-0,0168	-0,0003
147	17.04.1989	10,5300	1.787,4900	0,0029	0,0009	0,0004	0,0025	0,0120	0,0002
148	18.04.1989	10,8100	1.809,4800	0,0262	0,0122	0,0167	0,0096	0,0122	0,0002
149	19.04.1989	10,8800	1.815,5100	0,0065	0,0033	0,0038	0,0026	0,0153	0,0002
150	20.04.1989	10,9700	1.811,2800	0,0082	-0,0023	-0,0044	0,0126	0,0173	0,0003
151	21.04.1989	11,1600	1.828,2000	0,0172	0,0093	0,0124	0,0047	0,0065	0,0001
152	24.04.1989	11,1300	1.823,8600	-0,0027	-0,0024	-0,0044	0,0017	-0,0043	-0,0001
153	25.04.1989	10,9700	1.814,4500	-0,0145	-0,0052	-0,0085	-0,0060	-0,0237	-0,0003
154	26.04.1989	10,7800	1.816,0400	-0,0175	0,0009	0,0003	-0,0177	-0,0249	-0,0004
155	27.04.1989	10,8100	1.829,8900	0,0028	0,0076	0,0100	-0,0072	-0,0096	-0,0001
156	28.04.1989	10,7800	1.830,6300	-0,0028	0,0004	-0,0004	-0,0024	-0,0044	-0,0001
157	01.05.1989	10,7200	1.827,3500	-0,0056	-0,0018	-0,0036	-0,0020	-0,0056	-0,0001
158	02.05.1989	10,6300	1.822,5900	-0,0084	-0,0026	-0,0048	-0,0037	-0,0025	0,0000
159	03.05.1989	10,6300	1.822,3800	0,0000	-0,0001	-0,0012	0,0012	-0,0004	0,0000
160	04.05.1989	10,5900	1.820,9000	-0,0038	-0,0008	-0,0022	-0,0016	-0,0028	0,0000
161	05.05.1989	10,5600	1.820,1600	-0,0028	-0,0004	-0,0016	-0,0012	0,0100	0,0001
162	08.05.1989	10,5900	1.810,8600	0,0028	-0,0051	-0,0084	0,0112	0,0105	0,0001
163	09.05.1989	10,5300	1.805,9900	-0,0057	-0,0027	-0,0049	-0,0008	-0,0026	0,0000
164	10.05.1989	10,5300	1.809,4800	0,0000	0,0019	0,0018	-0,0018	-0,0085	-0,0001
165	11.05.1989	10,5000	1.815,6200	-0,0029	0,0034	0,0039	-0,0068	-0,0079	-0,0001
166	12.05.1989	10,7800	1.851,7800	0,0263	0,0197	0,0275	-0,0012	-0,0122	-0,0002
167	15.05.1989	10,7500	1.863,6200	-0,0028	0,0064	0,0082	-0,0110	-0,0101	-0,0001
168	16.05.1989	10,7200	1.860,1300	-0,0028	-0,0019	-0,0037	0,0009	-0,0068	-0,0001
169	17.05.1989	10,7200	1.871,3400	0,0000	0,0060	0,0077	-0,0077	-0,0009	0,0000
170	18.05.1989	10,8100	1.874,6200	0,0084	0,0018	0,0015	0,0068	0,0093	0,0001
171	19.05.1989	10,9700	1.891,8500	0,0147	0,0091	0,0122	0,0025	0,0082	0,0001

172	22.05.1989	11,0600	1.896,4000	0,0082	0,0024	0,0025	0,0057	0,0071	0,0001
173	23.05.1989	10,9100	1.878,0000	-0,0137	-0,0098	-0,0151	0,0014	0,0050	0,0001
174	24.05.1989	10,9700	1.881,8100	0,0055	0,0020	0,0019	0,0036		
175	25.05.1989	10,9100	1.882,6500	-0,0055	0,0004				
176	26.05.1989	10,9400	1.895,9800	0,0027	0,0071				
177	29.05.1989	10,9400	1.895,9800	0,0000	0,0000				
178	30.05.1989	10,7200	1.883,2900	-0,0203	-0,0067				
179	31.05.1989	10,7800	1.891,1100	0,0056	0,0041				
180	01.06.1989	10,7800	1.899,3600	0,0000	0,0044				
181	02.06.1989	10,9100	1.919,0300	0,0120	0,0103				
182	05.06.1989	10,8800	1.902,1100	-0,0028	-0,0089				
183	06.06.1989	11,0000	1.913,1100	0,0110	0,0058				
184	07.06.1989	11,0600	1.928,0100	0,0054	0,0078				
185	08.06.1989	10,9400	1.928,5400	-0,0109	0,0003				
186	09.06.1989	10,9700	1.928,3300	0,0027	-0,0001				
187	12.06.1989	11,0600	1.925,6900	0,0082	-0,0014				
188	13.06.1989	11,0900	1.913,2100	0,0027	-0,0065				
189	14.06.1989	11,1300	1.912,0500	0,0036	-0,0006				
190	15.06.1989	10,9400	1.892,3800	-0,0172	-0,0103				
191	16.06.1989	11,0300	1.898,9400	0,0082	0,0035				
192	19.06.1989	11,1300	1.901,0500	0,0090	0,0011				
193	20.06.1989	11,1900	1.897,8800	0,0054	-0,0017				
194	21.06.1989	11,1600	1.894,6000	-0,0027	-0,0017				
195	22.06.1989	11,0000	1.903,8000	-0,0144	0,0048				
196	23.06.1989	11,1600	1.933,5100	0,0144	0,0155				
197	26.06.1989	11,3100	1.926,5300	0,0134	-0,0036				
198	27.06.1989	11,4400	1.936,9000	0,0114	0,0054				
199	28.06.1989	11,2800	1.923,0400	-0,0141	-0,0072				
200	29.06.1989	11,1300	1.890,0500	-0,0134	-0,0173				
201	30.06.1989	11,0000	1.881,0700	-0,0117	-0,0048				
202	03.07.1989	11,0000	1.887,5200	0,0000	0,0034				
203	04.07.1989	11,0000	1.887,5200	0,0000	0,0000				
204	05.07.1989	11,0300	1.895,3400	0,0027	0,0041				
205	06.07.1989	11,0000	1.892,9100	-0,0027	-0,0013				
206	07.07.1989	11,0600	1.919,7700	0,0054	0,0141				
207	10.07.1989	11,0900	1.931,8200	0,0027	0,0063				
208	11.07.1989	11,0900	1.941,5500	0,0000	0,0050				
209	12.07.1989	11,2500	1.947,1500	0,0143	0,0029				
210	13.07.1989	11,2500	1.948,8400	0,0000	0,0009				
211	14.07.1989	11,4100	1.956,7700	0,0141	0,0041				
212	17.07.1989	11,4100	1.960,0500	0,0000	0,0017				
213	18.07.1989	11,3100	1.955,1900	-0,0088	-0,0025				
214	19.07.1989	11,5300	1.978,3400	0,0193	0,0118				
215	20.07.1989	11,4400	1.967,8800	-0,0078	-0,0053				
216	21.07.1989	11,6900	1.978,8700	0,0216	0,0056				

217	24.07.1989	11,2800	1.967,0300	-0,0357	-0,0060				
218	25.07.1989	11,0000	1.967,7700	-0,0251	0,0004				
219	26.07.1989	11,1300	1.989,3400	0,0117	0,0109				
220	27.07.1989	11,2500	2.011,3400	0,0107	0,0110				
221	28.07.1989	11,2200	2.013,0300	-0,0027	0,0008				
222	31.07.1989	11,4400	2.034,4900	0,0194	0,0106				
223	01.08.1989	11,2200	2.023,6000	-0,0194	-0,0054				
224	02.08.1989	11,1900	2.027,8300	-0,0027	0,0021				
225	03.08.1989	11,1900	2.031,1100	0,0000	0,0016				
226	04.08.1989	11,3400	2.026,3500	0,0133	-0,0023				
227	07.08.1989	11,5000	2.053,3100	0,0140	0,0132				
228	08.08.1989	11,2200	2.053,7400	-0,0246	0,0002				
229	09.08.1989	11,0300	2.042,8400	-0,0171	-0,0053				
230	10.08.1989	11,0600	2.050,9900	0,0027	0,0040				
231	11.08.1989	10,9100	2.033,0100	-0,0137	-0,0088				
232	14.08.1989	11,0600	2.023,4900	0,0137	-0,0047				
233	15.08.1989	11,2800	2.031,0000	0,0197	0,0037				
234	16.08.1989	11,0900	2.036,9200	-0,0170	0,0029				
235	17.08.1989	10,9400	2.029,6300	-0,0136	-0,0036				
236	18.08.1989	10,9400	2.036,9200	0,0000	0,0036				
237	21.08.1989	10,8100	2.008,6900	-0,0120	-0,0140				
238	22.08.1989	10,8800	2.010,1700	0,0065	0,0007				
239	23.08.1989	10,9700	2.028,4600	0,0082	0,0091				
240	24.08.1989	11,0600	2.064,9400	0,0082	0,0178				
241	25.08.1989	10,9700	2.059,6600	-0,0082	-0,0026				
242	28.08.1989	11,0000	2.066,6400	0,0027	0,0034				
243	29.08.1989	10,9400	2.056,2700	-0,0055	-0,0050				
244	30.08.1989	10,9700	2.060,9300	0,0027	0,0023				
245	31.08.1989	10,9400	2.064,7300	-0,0027	0,0018				
246	01.09.1989	11,0000	2.076,3600	0,0055	0,0056				
247	04.09.1989	11,0000	2.076,3600	0,0000	0,0000				
248	05.09.1989	10,9700	2.070,7600	-0,0027	-0,0027				
249	06.09.1989	10,9700	2.053,2100	0,0000	-0,0085				
250	07.09.1989	11,0600	2.048,9800	0,0082	-0,0021				
251	08.09.1989	11,0900	2.050,7800	0,0027	0,0009				
252	11.09.1989	11,1600	2.043,9000	0,0063	-0,0034				
253	12.09.1989	11,3400	2.043,8000	0,0160	0,0000				
254	13.09.1989	11,1300	2.033,2200	-0,0187	-0,0052				
255	14.09.1989	11,1600	2.019,0500	0,0027	-0,0070				
256	15.09.1989	11,2200	2.025,8200	0,0054	0,0033				
257	18.09.1989	11,2200	2.034,7000	0,0000	0,0044				
258	19.09.1989	11,2800	2.035,0200	0,0053	0,0002				
259	20.09.1989	11,2500	2.034,9100	-0,0027	-0,0001				
260	21.09.1989	11,2500	2.031,8500	0,0000	-0,0015				
261	22.09.1989	11,3400	2.037,8800	0,0080	0,0030				

Event 3 : HSBC Settlement on Money-Laundering Scandal

event_id	Date	HSBC	FTSE	Ri	Rm	Rexp	AR	CAR	CAAR
1	04.06.2012	503,20	5260,19						
2	05.06.2012	503,20	5260,19	0,0000	0,0000				
3	06.06.2012	527,00	5384,11	0,0462	0,0233				
4	07.06.2012	535,00	5447,79	0,0151	0,0118				
5	08.06.2012	531,40	5435,08	-0,0068	-0,0023				
6	11.06.2012	533,80	5432,37	0,0045	-0,0005				
7	12.06.2012	539,10	5473,74	0,0099	0,0076				
8	13.06.2012	545,00	5483,81	0,0109	0,0018				
9	14.06.2012	545,50	5467,05	0,0009	-0,0031				
10	15.06.2012	546,40	5478,81	0,0016	0,0021				
11	18.06.2012	546,70	5491,09	0,0005	0,0022				
12	19.06.2012	560,50	5586,31	0,0249	0,0172				
13	20.06.2012	565,30	5622,29	0,0085	0,0064				
14	21.06.2012	559,20	5566,36	-0,0108	-0,0100				
15	22.06.2012	562,30	5513,69	0,0055	-0,0095				
16	25.06.2012	558,30	5450,65	-0,0071	-0,0115				
17	26.06.2012	559,40	5446,96	0,0020	-0,0007				
18	27.06.2012	573,00	5523,92	0,0240	0,0140				
19	28.06.2012	558,20	5493,06	-0,0262	-0,0056				
20	29.06.2012	561,10	5571,15	0,0052	0,0141				
21	02.07.2012	570,10	5640,64	0,0159	0,0124				
22	03.07.2012	570,30	5687,73	0,0004	0,0083				
23	04.07.2012	567,60	5684,47	-0,0047	-0,0006				
24	05.07.2012	566,40	5692,63	-0,0021	0,0014				
25	06.07.2012	565,60	5662,63	-0,0014	-0,0053				
26	09.07.2012	561,10	5627,33	-0,0080	-0,0063				
27	10.07.2012	566,30	5664,07	0,0092	0,0065				
28	11.07.2012	568,70	5664,48	0,0042	0,0001				
29	12.07.2012	555,90	5608,25	-0,0228	-0,0100				
30	13.07.2012	560,00	5666,13	0,0073	0,0103				
31	16.07.2012	556,80	5662,43	-0,0057	-0,0007				
32	17.07.2012	547,40	5629,09	-0,0170	-0,0059				
33	18.07.2012	545,70	5685,77	-0,0031	0,0100				
34	19.07.2012	549,40	5714,19	0,0068	0,0050				
35	20.07.2012	533,20	5651,77	-0,0299	-0,0110				
36	23.07.2012	514,60	5533,87	-0,0355	-0,0211				
37	24.07.2012	510,60	5499,23	-0,0078	-0,0063				
38	25.07.2012	517,60	5498,32	0,0136	-0,0002				
39	26.07.2012	525,70	5573,16	0,0155	0,0135				
40	27.07.2012	531,10	5627,21	0,0102	0,0097				

41	30.07.2012	543,10	5693,63	0,0223	0,0117				
42	31.07.2012	533,90	5635,28	-0,0171	-0,0103				
43	01.08.2012	540,60	5712,82	0,0125	0,0137				
44	02.08.2012	538,70	5662,30	-0,0035	-0,0089				
45	03.08.2012	560,50	5787,28	0,0397	0,0218				
46	06.08.2012	560,30	5808,77	-0,0004	0,0037				
47	07.08.2012	560,70	5841,24	0,0007	0,0056				
48	08.08.2012	563,30	5845,92	0,0046	0,0008				
49	09.08.2012	566,00	5851,51	0,0048	0,0010				
50	10.08.2012	566,80	5847,11	0,0014	-0,0008				
51	13.08.2012	565,70	5831,88	-0,0019	-0,0026				
52	14.08.2012	569,00	5864,78	0,0058	0,0056				
53	15.08.2012	562,20	5833,04	-0,0120	-0,0054				
54	16.08.2012	564,80	5834,51	0,0046	0,0003				
55	17.08.2012	570,00	5852,42	0,0092	0,0031				
56	20.08.2012	563,10	5824,37	-0,0122	-0,0048				
57	21.08.2012	567,90	5857,52	0,0085	0,0057				
58	22.08.2012	559,40	5774,20	-0,0151	-0,0143				
59	23.08.2012	559,10	5776,60	-0,0005	0,0004				
60	24.08.2012	557,00	5776,60	-0,0038	0,0000				
61	27.08.2012	557,00	5776,60	0,0000	0,0000				
62	28.08.2012	558,40	5775,71	0,0025	-0,0002				
63	29.08.2012	553,70	5743,53	-0,0085	-0,0056				
64	30.08.2012	547,90	5719,45	-0,0105	-0,0042				
65	31.08.2012	547,10	5711,48	-0,0015	-0,0014				
66	03.09.2012	551,00	5758,41	0,0071	0,0082				
67	04.09.2012	544,60	5672,01	-0,0117	-0,0151				
68	05.09.2012	541,00	5657,86	-0,0066	-0,0025				
69	06.09.2012	555,10	5777,34	0,0257	0,0209				
70	07.09.2012	563,50	5794,80	0,0150	0,0030				
71	10.09.2012	563,70	5793,20	0,0004	-0,0003				
72	11.09.2012	564,60	5792,19	0,0016	-0,0002				
73	12.09.2012	569,10	5782,08	0,0079	-0,0017				
74	13.09.2012	568,10	5819,92	-0,0018	0,0065				
75	14.09.2012	584,40	5915,55	0,0283	0,0163				
76	17.09.2012	583,20	5893,52	-0,0021	-0,0037				
77	18.09.2012	577,90	5868,16	-0,0091	-0,0043				
78	19.09.2012	587,80	5888,48	0,0170	0,0035				
79	20.09.2012	587,00	5854,64	-0,0014	-0,0058				
80	21.09.2012	584,20	5852,62	-0,0048	-0,0003				
81	24.09.2012	585,00	5838,84	0,0014	-0,0024				
82	25.09.2012	583,80	5859,71	-0,0021	0,0036				
83	26.09.2012	573,70	5768,09	-0,0175	-0,0158				
84	27.09.2012	579,50	5779,42	0,0101	0,0020				
85	28.09.2012	573,30	5742,07	-0,0108	-0,0065				

86	01.10.2012	587,50	5820,45	0,0245	0,0136				
87	02.10.2012	580,50	5809,45	-0,0120	-0,0019				
88	03.10.2012	587,70	5825,81	0,0123	0,0028				
89	04.10.2012	592,80	5827,78	0,0086	0,0003				
90	05.10.2012	599,80	5871,02	0,0117	0,0074	0,0101	0,0017		
91	08.10.2012	595,80	5841,74	-0,0067	-0,0050	-0,0068	0,0001	0,0018	0,0006
92	09.10.2012	591,00	5810,25	-0,0081	-0,0054	-0,0074	-0,0007	-0,0006	-0,0001
93	10.10.2012	589,60	5776,71	-0,0024	-0,0058	-0,0079	0,0055	0,0048	0,0010
94	11.10.2012	597,20	5829,75	0,0128	0,0091	0,0125	0,0003	0,0059	0,0010
95	12.10.2012	595,30	5793,32	-0,0032	-0,0063	-0,0086	0,0054	0,0057	0,0008
96	15.10.2012	600,30	5805,61	0,0084	0,0021	0,0029	0,0055	0,0108	0,0014
97	16.10.2012	611,00	5870,54	0,0177	0,0111	0,0152	0,0025	0,0080	0,0009
98	17.10.2012	612,70	5910,91	0,0028	0,0069	0,0093	-0,0066	-0,0041	-0,0004
99	18.10.2012	616,90	5917,05	0,0068	0,0010	0,0014	0,0054	-0,0012	-0,0001
100	19.10.2012	615,30	5896,15	-0,0026	-0,0035	-0,0048	0,0022	0,0076	0,0006
101	22.10.2012	618,00	5882,91	0,0044	-0,0022	-0,0031	0,0074	0,0097	0,0007
102	23.10.2012	612,90	5797,91	-0,0083	-0,0146	-0,0199	0,0116	0,0190	0,0014
103	24.10.2012	610,00	5804,78	-0,0047	0,0012	0,0016	-0,0064	0,0052	0,0003
104	25.10.2012	614,00	5805,05	0,0065	0,0000	0,0001	0,0065	0,0001	0,0000
105	26.10.2012	610,40	5806,71	-0,0059	0,0003	0,0004	-0,0063	0,0002	0,0000
106	29.10.2012	610,90	5795,10	0,0008	-0,0020	-0,0027	0,0035	-0,0027	-0,0002
107	30.10.2012	611,60	5849,90	0,0011	0,0094	0,0128	-0,0117	-0,0081	-0,0004
108	31.10.2012	608,80	5782,70	-0,0046	-0,0116	-0,0158	0,0112	-0,0005	0,0000
109	01.11.2012	625,00	5861,92	0,0263	0,0136	0,0186	0,0077	0,0189	0,0009
110	02.11.2012	626,10	5868,55	0,0018	0,0011	0,0015	0,0002	0,0079	0,0004
111	05.11.2012	618,00	5839,06	-0,0130	-0,0050	-0,0069	-0,0062	-0,0059	-0,0003
112	06.11.2012	621,70	5884,90	0,0060	0,0078	0,0107	-0,0047	-0,0108	-0,0005
113	07.11.2012	607,80	5791,63	-0,0226	-0,0160	-0,0218	-0,0008	-0,0055	-0,0002
114	08.11.2012	602,90	5776,05	-0,0081	-0,0027	-0,0037	-0,0044	-0,0052	-0,0002
115	09.11.2012	600,90	5769,68	-0,0033	-0,0011	-0,0015	-0,0018	-0,0062	-0,0002
116	12.11.2012	603,80	5767,27	0,0048	-0,0004	-0,0006	0,0054	0,0036	0,0001
117	13.11.2012	608,60	5786,25	0,0079	0,0033	0,0045	0,0034	0,0088	0,0003
118	14.11.2012	603,00	5722,01	-0,0092	-0,0112	-0,0152	0,0060	0,0094	0,0003
119	15.11.2012	601,30	5677,75	-0,0028	-0,0078	-0,0106	0,0078	0,0138	0,0004
120	16.11.2012	595,80	5605,59	-0,0092	-0,0128	-0,0174	0,0083	0,0160	0,0005
121	19.11.2012	618,30	5737,66	0,0371	0,0233	0,0318	0,0053	0,0136	0,0004
122	20.11.2012	614,50	5748,10	-0,0062	0,0018	0,0025	-0,0086	-0,0033	-0,0001
123	21.11.2012	618,00	5752,03	0,0057	0,0007	0,0009	0,0047	-0,0039	-0,0001
124	22.11.2012	622,00	5791,03	0,0065	0,0068	0,0092	-0,0028	0,0020	0,0001
125	23.11.2012	625,90	5819,14	0,0063	0,0048	0,0066	-0,0004	-0,0031	-0,0001
126	26.11.2012	620,00	5786,72	-0,0095	-0,0056	-0,0076	-0,0019	-0,0022	-0,0001
127	27.11.2012	620,90	5799,71	0,0015	0,0022	0,0031	-0,0016	-0,0035	-0,0001
128	28.11.2012	622,80	5803,28	0,0031	0,0006	0,0008	0,0022	0,0006	0,0000
129	29.11.2012	631,60	5870,30	0,0140	0,0115	0,0157	-0,0016	0,0006	0,0000
130	30.11.2012	637,70	5866,82	0,0096	-0,0006	-0,0008	0,0104	0,0088	0,0002

131	03.12.2012	635,90	5871,24	-0,0028	0,0008	0,0010	-0,0039	0,0066	0,0002
132	04.12.2012	636,20	5869,04	0,0005	-0,0004	-0,0005	0,0010	-0,0029	-0,0001
133	05.12.2012	644,10	5892,08	0,0123	0,0039	0,0053	0,0070	0,0080	0,0002
134	06.12.2012	643,80	5901,42	-0,0005	0,0016	0,0022	-0,0026	0,0044	0,0001
135	07.12.2012	643,60	5914,40	-0,0003	0,0022	0,0030	-0,0033	-0,0059	-0,0001
136	10.12.2012	641,20	5921,63	-0,0037	0,0012	0,0017	-0,0054	-0,0087	-0,0002
137	11.12.2012	644,80	5924,97	0,0056	0,0006	0,0008	0,0048	-0,0006	0,0000
138	12.12.2012	643,80	5945,85	-0,0016	0,0035	0,0048	-0,0064	-0,0015	0,0000
139	13.12.2012	643,40	5929,61	-0,0006	-0,0027	-0,0037	0,0031	-0,0032	-0,0001
140	14.12.2012	641,60	5921,76	-0,0028	-0,0013	-0,0018	-0,0010	0,0021	0,0000
141	17.12.2012	641,50	5912,15	-0,0002	-0,0016	-0,0022	0,0021	0,0011	0,0000
142	18.12.2012	640,20	5935,90	-0,0020	0,0040	0,0055	-0,0075	-0,0054	-0,0001
143	19.12.2012	653,00	5961,59	0,0198	0,0043	0,0059	0,0139	0,0064	0,0001
144	20.12.2012	650,00	5958,34	-0,0046	-0,0005	-0,0007	-0,0039	0,0100	0,0002
145	21.12.2012	649,70	5939,99	-0,0005	-0,0031	-0,0042	0,0037	-0,0001	0,0000
146	24.12.2012	654,90	5954,18	0,0080	0,0024	0,0033	0,0047	0,0085	0,0001
147	25.12.2012	654,90	5954,18	0,0000	0,0000	0,0000	0,0000	0,0047	0,0001
148	26.12.2012	654,90	5954,18	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
149	27.12.2012	652,00	5954,30	-0,0044	0,0000	0,0000	-0,0045	-0,0045	-0,0001
150	28.12.2012	651,30	5925,37	-0,0011	-0,0049	-0,0066	0,0056	0,0011	0,0000
151	31.12.2012	646,90	5897,81	-0,0068	-0,0047	-0,0064	-0,0004	0,0052	0,0001
152	01.01.2013	646,90	5897,81	0,0000	0,0000	0,0000	0,0000	-0,0004	0,0000
153	02.01.2013	665,70	6027,37	0,0286	0,0217	0,0296	-0,0010	-0,0010	0,0000
154	03.01.2013	662,50	6047,34	-0,0048	0,0033	0,0045	-0,0093	-0,0103	-0,0002
155	04.01.2013	667,60	6089,84	0,0077	0,0070	0,0096	-0,0019	-0,0112	-0,0002
156	07.01.2013	666,20	6064,58	-0,0021	-0,0042	-0,0057	0,0036	0,0017	0,0000
157	08.01.2013	659,20	6053,63	-0,0106	-0,0018	-0,0025	-0,0081	-0,0045	-0,0001
158	09.01.2013	669,90	6098,65	0,0161	0,0074	0,0101	0,0060	-0,0021	0,0000
159	10.01.2013	673,40	6101,51	0,0052	0,0005	0,0006	0,0046	0,0106	0,0001
160	11.01.2013	677,70	6121,58	0,0064	0,0033	0,0045	0,0019	0,0065	0,0001
161	14.01.2013	675,80	6107,86	-0,0028	-0,0022	-0,0031	0,0003	0,0021	0,0000
162	15.01.2013	679,60	6117,31	0,0056	0,0015	0,0021	0,0035	0,0038	0,0001
163	16.01.2013	683,40	6103,98	0,0056	-0,0022	-0,0030	0,0086	0,0121	0,0002
164	17.01.2013	691,10	6132,36	0,0112	0,0046	0,0063	0,0049	0,0134	0,0002
165	18.01.2013	693,90	6154,41	0,0040	0,0036	0,0049	-0,0009	0,0040	0,0001
166	21.01.2013	695,50	6180,98	0,0023	0,0043	0,0059	-0,0036	-0,0044	-0,0001
167	22.01.2013	693,00	6179,17	-0,0036	-0,0003	-0,0004	-0,0032	-0,0068	-0,0001
168	23.01.2013	695,10	6197,64	0,0030	0,0030	0,0041	-0,0010	-0,0042	-0,0001
169	24.01.2013	704,90	6264,91	0,0140	0,0108	0,0147	-0,0007	-0,0018	0,0000
170	25.01.2013	710,30	6284,45	0,0076	0,0031	0,0042	0,0034	0,0027	0,0000
171	28.01.2013	717,10	6294,41	0,0095	0,0016	0,0022	0,0074	0,0108	0,0001
172	29.01.2013	720,10	6339,19	0,0042	0,0071	0,0097	-0,0055	0,0019	0,0000
173	30.01.2013	724,10	6323,11	0,0055	-0,0025	-0,0035	0,0090	0,0035	0,0000
174	31.01.2013	716,70	6276,88	-0,0103	-0,0073	-0,0100	-0,0003	0,0087	0,0001
175	01.02.2013	719,60	6347,24	0,0040	0,0111	0,0152	-0,0112	-0,0114	-0,0001

176	04.02.2013	706,10	6246,84	-0,0189	-0,0159	-0,0217	0,0028	-0,0084	-0,0001
177	05.02.2013	709,40	6282,76	0,0047	0,0057				
178	06.02.2013	713,10	6295,34	0,0052	0,0020				
179	07.02.2013	700,40	6228,42	-0,0180	-0,0107				
180	08.02.2013	716,70	6263,93	0,0230	0,0057				
181	11.02.2013	718,30	6277,06	0,0022	0,0021				
182	12.02.2013	728,90	6338,38	0,0146	0,0097				
183	13.02.2013	730,90	6359,11	0,0027	0,0033				
184	14.02.2013	724,20	6327,36	-0,0092	-0,0050				
185	15.02.2013	726,40	6328,26	0,0030	0,0001				
186	18.02.2013	726,00	6318,19	-0,0006	-0,0016				
187	19.02.2013	728,80	6379,07	0,0038	0,0096				
188	20.02.2013	732,90	6395,37	0,0056	0,0026				
189	21.02.2013	716,40	6291,54	-0,0228	-0,0164				
190	22.02.2013	721,40	6335,70	0,0070	0,0070				
191	25.02.2013	729,90	6355,37	0,0117	0,0031				
192	26.02.2013	713,00	6270,44	-0,0234	-0,0135				
193	27.02.2013	725,00	6325,88	0,0167	0,0088				
194	28.02.2013	731,40	6360,81	0,0088	0,0055				
195	01.03.2013	728,10	6378,60	-0,0045	0,0028				
196	04.03.2013	710,00	6345,63	-0,0252	-0,0052				
197	05.03.2013	714,30	6431,95	0,0060	0,0135				
198	06.03.2013	713,60	6427,64	-0,0010	-0,0007				
199	07.03.2013	718,20	6439,16	0,0064	0,0018				
200	08.03.2013	737,00	6483,58	0,0258	0,0069				
201	11.03.2013	734,70	6503,63	-0,0031	0,0031				
202	12.03.2013	729,40	6510,62	-0,0072	0,0011				
203	13.03.2013	726,60	6481,50	-0,0038	-0,0045				
204	14.03.2013	740,00	6529,41	0,0183	0,0074				
205	15.03.2013	720,10	6489,65	-0,0273	-0,0061				
206	18.03.2013	720,20	6457,92	0,0001	-0,0049				
207	19.03.2013	716,40	6441,32	-0,0053	-0,0026				
208	20.03.2013	712,00	6432,70	-0,0062	-0,0013				
209	21.03.2013	703,80	6388,55	-0,0116	-0,0069				
210	22.03.2013	699,80	6392,76	-0,0057	0,0007				
211	25.03.2013	695,00	6378,38	-0,0069	-0,0023				
212	26.03.2013	698,50	6399,37	0,0050	0,0033				
213	27.03.2013	697,60	6387,56	-0,0013	-0,0018				
214	28.03.2013	702,50	6411,74	0,0070	0,0038				
215	29.03.2013	702,50	6411,74	0,0000	0,0000				
216	01.04.2013	702,50	6411,74	0,0000	0,0000				
217	02.04.2013	711,20	6490,66	0,0123	0,0122				
218	03.04.2013	701,50	6420,28	-0,0137	-0,0109				
219	04.04.2013	694,00	6344,12	-0,0107	-0,0119				
220	05.04.2013	681,50	6249,78	-0,0182	-0,0150				

221	08.04.2013	679,70	6276,94	-0,0026	0,0043				
222	09.04.2013	683,90	6313,21	0,0062	0,0058				
223	10.04.2013	691,00	6387,37	0,0103	0,0117				
224	11.04.2013	692,00	6416,14	0,0014	0,0045				
225	12.04.2013	688,10	6384,39	-0,0057	-0,0050				
226	15.04.2013	681,40	6343,60	-0,0098	-0,0064				
227	16.04.2013	677,60	6304,58	-0,0056	-0,0062				
228	17.04.2013	671,00	6244,21	-0,0098	-0,0096				
229	18.04.2013	663,30	6243,67	-0,0115	-0,0001				
230	19.04.2013	679,20	6286,59	0,0237	0,0069				
231	22.04.2013	679,20	6280,62	0,0000	-0,0010				
232	23.04.2013	688,30	6406,12	0,0133	0,0198				
233	24.04.2013	695,00	6431,76	0,0097	0,0040				
234	25.04.2013	690,50	6442,59	-0,0065	0,0017				
235	26.04.2013	699,90	6426,42	0,0135	-0,0025				
236	29.04.2013	703,60	6458,02	0,0053	0,0049				
237	30.04.2013	703,50	6430,12	-0,0001	-0,0043				
238	01.05.2013	707,50	6451,29	0,0057	0,0033				
239	02.05.2013	711,10	6460,71	0,0051	0,0015				
240	03.05.2013	713,90	6521,46	0,0039	0,0094				
241	06.05.2013	713,90	6521,46	0,0000	0,0000				
242	07.05.2013	735,00	6557,30	0,0291	0,0055				
243	08.05.2013	734,50	6583,48	-0,0007	0,0040				
244	09.05.2013	730,50	6592,74	-0,0055	0,0014				
245	10.05.2013	744,80	6624,98	0,0194	0,0049				
246	13.05.2013	739,60	6631,76	-0,0070	0,0010				
247	14.05.2013	746,40	6686,06	0,0092	0,0082				
248	15.05.2013	754,40	6693,55	0,0107	0,0011				
249	16.05.2013	749,00	6687,80	-0,0072	-0,0009				
250	17.05.2013	758,60	6723,06	0,0127	0,0053				
251	20.05.2013	769,90	6755,63	0,0148	0,0048				
252	21.05.2013	765,30	6803,87	-0,0060	0,0071				
253	22.05.2013	767,80	6840,27	0,0033	0,0053				
254	23.05.2013	741,80	6696,79	-0,0345	-0,0212				
255	24.05.2013	726,00	6654,34	-0,0215	-0,0064				
256	27.05.2013	726,00	6654,34	0,0000	0,0000				
257	28.05.2013	743,10	6762,01	0,0233	0,0161				
258	29.05.2013	727,60	6627,17	-0,0211	-0,0201				
259	30.05.2013	735,90	6656,99	0,0113	0,0045				
260	31.05.2013	725,90	6583,09	-0,0137	-0,0112				
261	03.06.2013	718,30	6525,12	-0,0105	-0,0088				

Event 4 : Libor Scandal

Event 4a : Barclays Settlement

event_id	Date	BARCLAYS	FTSE	Ri1	Rm1	Rexp1	AR1
1	02.01.2012	162,63	5572,28				
2	03.01.2012	172,09	5699,91	0,0565	0,0226		
3	04.01.2012	173,99	5668,45	0,0110	-0,0055		
4	05.01.2012	169,65	5624,26	-0,0253	-0,0078		
5	06.01.2012	172,19	5649,68	0,0149	0,0045		
6	09.01.2012	164,52	5612,26	-0,0456	-0,0066		
7	10.01.2012	173,94	5696,70	0,0557	0,0149		
8	11.01.2012	175,79	5670,82	0,0106	-0,0046		
9	12.01.2012	178,70	5662,42	0,0164	-0,0015		
10	13.01.2012	185,86	5636,64	0,0393	-0,0046		
11	16.01.2012	183,92	5657,44	-0,0105	0,0037		
12	17.01.2012	184,06	5693,95	0,0008	0,0064		
13	18.01.2012	185,77	5702,37	0,0092	0,0015		
14	19.01.2012	204,47	5741,15	0,0959	0,0068		
15	20.01.2012	205,67	5728,55	0,0059	-0,0022		
16	23.01.2012	205,67	5782,56	0,0000	0,0094		
17	24.01.2012	201,84	5751,90	-0,0188	-0,0053		
18	25.01.2012	200,68	5723,00	-0,0058	-0,0050		
19	26.01.2012	205,86	5795,20	0,0255	0,0125		
20	27.01.2012	205,86	5733,45	0,0000	-0,0107		
21	30.01.2012	197,27	5671,09	-0,0426	-0,0109		
22	31.01.2012	196,34	5681,61	-0,0047	0,0019		
23	01.02.2012	207,01	5790,72	0,0529	0,0190		
24	02.02.2012	210,52	5796,07	0,0168	0,0009		
25	03.02.2012	219,34	5901,07	0,0410	0,0180		
26	06.02.2012	213,75	5892,20	-0,0258	-0,0015		
27	07.02.2012	218,74	5890,26	0,0231	-0,0003		
28	08.02.2012	215,79	5875,93	-0,0136	-0,0024		
29	09.02.2012	215,33	5895,47	-0,0021	0,0033		
30	10.02.2012	216,20	5852,39	0,0040	-0,0073		
31	13.02.2012	218,88	5905,70	0,0123	0,0091		
32	14.02.2012	216,99	5899,87	-0,0087	-0,0010		
33	15.02.2012	223,22	5892,16	0,0283	-0,0013		
34	16.02.2012	226,23	5885,38	0,0134	-0,0012		
35	17.02.2012	229,41	5905,07	0,0140	0,0033		
36	20.02.2012	231,77	5945,25	0,0102	0,0068		
37	21.02.2012	228,86	5928,20	-0,0126	-0,0029		
38	22.02.2012	220,96	5916,55	-0,0351	-0,0020		
39	23.02.2012	222,62	5937,89	0,0075	0,0036		

40	24.02.2012	228,77	5935,13	0,0273	-0,0005		
41	27.02.2012	225,21	5915,55	-0,0157	-0,0033		
42	28.02.2012	225,35	5927,91	0,0006	0,0021		
43	29.02.2012	226,32	5871,51	0,0043	-0,0096		
44	01.03.2012	232,00	5931,25	0,0248	0,0101		
45	02.03.2012	237,17	5911,13	0,0220	-0,0034		
46	05.03.2012	233,62	5874,82	-0,0151	-0,0062		
47	06.03.2012	220,68	5765,80	-0,0570	-0,0187		
48	07.03.2012	220,78	5791,41	0,0005	0,0044		
49	08.03.2012	222,35	5859,73	0,0071	0,0117		
50	09.03.2012	222,35	5887,49	0,0000	0,0047		
51	12.03.2012	217,87	5892,75	-0,0204	0,0009		
52	13.03.2012	221,28	5955,91	0,0155	0,0107		
53	14.03.2012	229,83	5945,43	0,0379	-0,0018		
54	15.03.2012	230,20	5940,72	0,0016	-0,0008		
55	16.03.2012	234,63	5965,58	0,0191	0,0042		
56	19.03.2012	232,14	5961,11	-0,0107	-0,0008		
57	20.03.2012	226,78	5891,41	-0,0234	-0,0118		
58	21.03.2012	226,04	5891,95	-0,0033	0,0001		
59	22.03.2012	221,33	5845,65	-0,0211	-0,0079		
60	23.03.2012	225,86	5854,89	0,0203	0,0016		
61	26.03.2012	228,77	5902,70	0,0128	0,0081		
62	27.03.2012	232,18	5869,55	0,0148	-0,0056		
63	28.03.2012	226,87	5808,99	-0,0231	-0,0104	-0,0178	-0,0053
64	29.03.2012	216,29	5742,03	-0,0478	-0,0116	-0,0204	-0,0273
65	30.03.2012	217,31	5768,45	0,0047	0,0046	0,0137	-0,0090
66	02.04.2012	218,42	5874,89	0,0051	0,0183	0,0425	-0,0374
67	03.04.2012	212,78	5838,34	-0,0262	-0,0062	-0,0091	-0,0170
68	04.04.2012	201,84	5703,77	-0,0528	-0,0233	-0,0451	-0,0077
69	05.04.2012	202,58	5723,67	0,0037	0,0035	0,0113	-0,0077
70	06.04.2012	202,58	5723,67	0,0000	0,0000	0,0040	-0,0040
71	09.04.2012	202,58	5723,67	0,0000	0,0000	0,0040	-0,0040
72	10.04.2012	190,57	5595,55	-0,0611	-0,0226	-0,0437	-0,0174
73	11.04.2012	195,93	5634,74	0,0277	0,0070	0,0187	0,0090
74	12.04.2012	206,41	5710,46	0,0521	0,0133	0,0321	0,0200
75	13.04.2012	198,51	5651,79	-0,0390	-0,0103	-0,0177	-0,0213
76	16.04.2012	194,73	5666,28	-0,0192	0,0026	0,0094	-0,0286
77	17.04.2012	203,73	5766,95	0,0452	0,0176	0,0411	0,0041
78	18.04.2012	197,91	5745,29	-0,0290	-0,0038	-0,0039	-0,0251
79	19.04.2012	196,11	5744,55	-0,0091	-0,0001	0,0037	-0,0129
80	20.04.2012	197,27	5772,15	0,0059	0,0048	0,0141	-0,0082
81	23.04.2012	188,95	5665,57	-0,0431	-0,0186	-0,0353	-0,0078
82	24.04.2012	194,91	5709,49	0,0311	0,0077	0,0203	0,0108
83	25.04.2012	194,91	5718,89	0,0000	0,0016	0,0075	-0,0075
84	26.04.2012	196,76	5748,72	0,0094	0,0052	0,0150	-0,0055

85	27.04.2012	206,09	5777,11	0,0463	0,0049	0,0144	0,0320
86	30.04.2012	201,61	5737,78	-0,0220	-0,0068	-0,0104	-0,0116
87	01.05.2012	208,95	5812,23	0,0358	0,0129	0,0312	0,0046
88	02.05.2012	197,36	5758,11	-0,0571	-0,0094	-0,0157	-0,0414
89	03.05.2012	196,62	5766,55	-0,0038	0,0015	0,0071	-0,0108
90	04.05.2012	192,51	5655,06	-0,0211	-0,0195	-0,0371	0,0160
91	07.05.2012	192,51	5655,06	0,0000	0,0000	0,0040	-0,0040
92	08.05.2012	187,57	5554,55	-0,0260	-0,0179	-0,0338	0,0078
93	09.05.2012	186,92	5530,05	-0,0035	-0,0044	-0,0053	0,0018
94	10.05.2012	192,88	5543,95	0,0314	0,0025	0,0093	0,0221
95	11.05.2012	187,34	5575,52	-0,0291	0,0057	0,0160	-0,0451
96	14.05.2012	175,33	5465,52	-0,0663	-0,0199	-0,0380	-0,0283
97	15.05.2012	171,91	5437,62	-0,0197	-0,0051	-0,0068	-0,0129
98	16.05.2012	174,63	5405,25	0,0157	-0,0060	-0,0086	0,0243
99	17.05.2012	168,03	5338,38	-0,0385	-0,0124	-0,0222	-0,0163
100	18.05.2012	162,67	5267,62	-0,0324	-0,0133	-0,0241	-0,0083
101	21.05.2012	166,27	5304,48	0,0219	0,0070	0,0187	0,0032
102	22.05.2012	174,50	5403,28	0,0483	0,0185	0,0429	0,0054
103	23.05.2012	166,74	5266,41	-0,0455	-0,0257	-0,0500	0,0045
104	24.05.2012	171,17	5350,05	0,0262	0,0158	0,0372	-0,0110
105	25.05.2012	167,84	5351,53	-0,0196	0,0003	0,0046	-0,0242
106	28.05.2012	167,20	5356,34	-0,0038	0,0009	0,0059	-0,0097
107	29.05.2012	167,20	5391,14	0,0000	0,0065	0,0176	-0,0176
108	30.05.2012	165,77	5297,28	-0,0086	-0,0176	-0,0330	0,0244
109	31.05.2012	162,86	5320,86	-0,0177	0,0044	0,0134	-0,0311
110	01.06.2012	160,27	5260,19	-0,0160	-0,0115	-0,0202	0,0041
111	04.06.2012	160,27	5260,19	0,0000	0,0000	0,0040	-0,0040
112	05.06.2012	160,27	5260,19	0,0000	0,0000	0,0040	-0,0040
113	06.06.2012	173,48	5384,11	0,0792	0,0233	0,0530	0,0262
114	07.06.2012	178,14	5447,79	0,0265	0,0118	0,0288	-0,0023
115	08.06.2012	175,83	5435,08	-0,0131	-0,0023	-0,0009	-0,0121
116	11.06.2012	176,02	5432,37	0,0011	-0,0005	0,0030	-0,0019
117	12.06.2012	175,28	5473,74	-0,0042	0,0076	0,0200	-0,0242
118	13.06.2012	173,94	5483,81	-0,0077	0,0018	0,0079	-0,0155
119	14.06.2012	178,05	5467,05	0,0234	-0,0031	-0,0024	0,0258
120	15.06.2012	185,49	5478,81	0,0409	0,0021	0,0085	0,0324
121	18.06.2012	181,10	5491,09	-0,0240	0,0022	0,0087	-0,0327
122	19.06.2012	185,30	5586,31	0,0229	0,0172	0,0402	-0,0173
123	20.06.2012	190,06	5622,29	0,0254	0,0064	0,0175	0,0078
124	21.06.2012	186,87	5566,36	-0,0169	-0,0100	-0,0171	0,0001
125	22.06.2012	185,40	5513,69	-0,0079	-0,0095	-0,0160	0,0081
126	25.06.2012	179,44	5450,65	-0,0327	-0,0115	-0,0202	-0,0125
127	26.06.2012	177,73	5446,96	-0,0096	-0,0007	0,0026	-0,0121
128	27.06.2012	181,10	5523,92	0,0188	0,0140	0,0335	-0,0148
129	28.06.2012	152,97	5493,06	-0,1688	-0,0056	-0,0078	-0,1610

130	29.06.2012	150,43	5571,15	-0,0167	0,0141	0,0337	-0,0505
131	02.07.2012	155,56	5640,64	0,0335	0,0124	0,0301	0,0034
132	03.07.2012	154,31	5687,73	-0,0081	0,0083	0,0215	-0,0296
133	04.07.2012	153,34	5684,47	-0,0063	-0,0006	0,0028	-0,0091
134	05.07.2012	155,37	5692,63	0,0132	0,0014	0,0070	0,0061
135	06.07.2012	152,19	5662,63	-0,0207	-0,0053	-0,0071	-0,0136
136	09.07.2012	150,94	5627,33	-0,0082	-0,0063	-0,0092	0,0009
137	10.07.2012	154,27	5664,07	0,0218	0,0065	0,0177	0,0041
138	11.07.2012	152,09	5664,48	-0,0142	0,0001	0,0042	-0,0184
139	12.07.2012	151,03	5608,25	-0,0070	-0,0100	-0,0170	0,0100
140	13.07.2012	149,79	5666,13	-0,0082	0,0103	0,0256	-0,0339
141	16.07.2012	145,67	5662,43	-0,0279	-0,0007	0,0026	-0,0305
142	17.07.2012	146,88	5629,09	0,0083	-0,0059	-0,0084	0,0167
143	18.07.2012	147,94	5685,77	0,0072	0,0100	0,0251	-0,0179
144	19.07.2012	151,73	5714,19	0,0253	0,0050	0,0145	0,0108
145	20.07.2012	147,11	5651,77	-0,0309	-0,0110	-0,0191	-0,0118
146	23.07.2012	140,92	5533,87	-0,0430	-0,0211	-0,0404	-0,0026
147	24.07.2012	139,12	5499,23	-0,0129	-0,0063	-0,0092	-0,0036
148	25.07.2012	139,07	5498,32	-0,0004	-0,0002	0,0037	-0,0040
149	26.07.2012	141,89	5573,16	0,0201	0,0135	0,0325	-0,0124
150	27.07.2012	154,27	5627,21	0,0837	0,0097	0,0243	0,0593
151	30.07.2012	157,54	5693,63	0,0210	0,0117	0,0287	-0,0077
152	31.07.2012	155,19	5635,28	-0,0150	-0,0103	-0,0177	0,0027
153	01.08.2012	155,47	5712,82	0,0018	0,0137	0,0328	-0,0310
154	02.08.2012	149,92	5662,30	-0,0364	-0,0089	-0,0147	-0,0216
155	03.08.2012	158,28	5787,28	0,0543	0,0218	0,0500	0,0043
156	06.08.2012	163,69	5808,77	0,0336	0,0037	0,0118	0,0218
157	07.08.2012	166,14	5841,24	0,0149	0,0056	0,0157	-0,0009
158	08.08.2012	165,30	5845,92	-0,0051	0,0008	0,0057	-0,0108
159	09.08.2012	165,30	5851,51	0,0000	0,0010	0,0060	-0,0060
160	10.08.2012	169,41	5847,11	0,0246	-0,0008	0,0024	0,0221
161	13.08.2012	169,09	5831,88	-0,0019	-0,0026	-0,0015	-0,0004
162	14.08.2012	171,59	5864,78	0,0147	0,0056	0,0158	-0,0012
163	15.08.2012	169,14	5833,04	-0,0144	-0,0054	-0,0074	-0,0070
164	16.08.2012	172,00	5834,51	0,0168	0,0003	0,0045	0,0122
165	17.08.2012	178,14	5852,42	0,0351	0,0031	0,0105	0,0246
166	20.08.2012	176,34	5824,37	-0,0102	-0,0048	-0,0061	-0,0040
167	21.08.2012	182,02	5857,52	0,0317	0,0057	0,0160	0,0158
168	22.08.2012	179,35	5774,20	-0,0148	-0,0143	-0,0262	0,0114
169	23.08.2012	176,44	5776,60	-0,0164	0,0004	0,0049	-0,0212
170	24.08.2012	172,93	5776,60	-0,0201	0,0000	0,0040	-0,0241
171	27.08.2012	172,93	5776,60	0,0000	0,0000	0,0040	-0,0040
172	28.08.2012	174,54	5775,71	0,0093	-0,0002		
173	29.08.2012	172,14	5743,53	-0,0138	-0,0056		
174	30.08.2012	169,51	5719,45	-0,0154	-0,0042		

175	31.08.2012	169,28	5711,48	-0,0014	-0,0014		
176	03.09.2012	170,25	5758,41	0,0057	0,0082		
177	04.09.2012	167,43	5672,01	-0,0167	-0,0151		
178	05.09.2012	168,08	5657,86	0,0039	-0,0025		
179	06.09.2012	178,33	5777,34	0,0592	0,0209		
180	07.09.2012	190,66	5794,80	0,0669	0,0030		
181	10.09.2012	191,91	5793,20	0,0065	-0,0003		
182	11.09.2012	197,22	5792,19	0,0273	-0,0002		
183	12.09.2012	200,45	5782,08	0,0162	-0,0017		
184	13.09.2012	201,33	5819,92	0,0044	0,0065		
185	14.09.2012	211,58	5915,55	0,0497	0,0163		
186	17.09.2012	210,61	5893,52	-0,0046	-0,0037		
187	18.09.2012	208,21	5868,16	-0,0115	-0,0043		
188	19.09.2012	207,98	5888,48	-0,0011	0,0035		
189	20.09.2012	205,12	5854,64	-0,0138	-0,0058		
190	21.09.2012	206,69	5852,62	0,0076	-0,0003		
191	24.09.2012	203,45	5838,84	-0,0158	-0,0024		
192	25.09.2012	206,18	5859,71	0,0133	0,0036		
193	26.09.2012	197,36	5768,09	-0,0437	-0,0158		
194	27.09.2012	200,68	5779,42	0,0167	0,0020		
195	28.09.2012	198,47	5742,07	-0,0111	-0,0065		
196	01.10.2012	205,39	5820,45	0,0343	0,0136		
197	02.10.2012	203,92	5809,45	-0,0072	-0,0019		
198	03.10.2012	203,45	5825,81	-0,0023	0,0028		
199	04.10.2012	205,58	5827,78	0,0104	0,0003		
200	05.10.2012	210,48	5871,02	0,0236	0,0074		
201	08.10.2012	205,39	5841,74	-0,0245	-0,0050		
202	09.10.2012	204,66	5810,25	-0,0036	-0,0054		
203	10.10.2012	205,07	5776,71	0,0020	-0,0058		
204	11.10.2012	214,91	5829,75	0,0469	0,0091		
205	12.10.2012	214,49	5793,32	-0,0020	-0,0063		
206	15.10.2012	218,79	5805,61	0,0198	0,0021		
207	16.10.2012	227,33	5870,54	0,0383	0,0111		
208	17.10.2012	225,76	5910,91	-0,0069	0,0069		
209	18.10.2012	222,35	5917,05	-0,0152	0,0010		
210	19.10.2012	216,02	5896,15	-0,0289	-0,0035		
211	22.10.2012	217,45	5882,91	0,0066	-0,0022		
212	23.10.2012	214,91	5797,91	-0,0118	-0,0146		
213	24.10.2012	212,37	5804,78	-0,0119	0,0012		
214	25.10.2012	215,09	5805,05	0,0127	0,0000		
215	26.10.2012	214,77	5806,71	-0,0015	0,0003		
216	29.10.2012	213,43	5795,10	-0,0063	-0,0020		
217	30.10.2012	220,59	5849,90	0,0330	0,0094		
218	31.10.2012	210,15	5782,70	-0,0485	-0,0116		
219	01.11.2012	221,01	5861,92	0,0504	0,0136		

220	02.11.2012	222,76	5868,55	0,0079	0,0011		
221	05.11.2012	219,39	5839,06	-0,0152	-0,0050		
222	06.11.2012	224,05	5884,90	0,0210	0,0078		
223	07.11.2012	217,87	5791,63	-0,0280	-0,0160		
224	08.11.2012	218,56	5776,05	0,0032	-0,0027		
225	09.11.2012	212,60	5769,68	-0,0276	-0,0011		
226	12.11.2012	217,03	5767,27	0,0206	-0,0004		
227	13.11.2012	219,20	5786,25	0,0099	0,0033		
228	14.11.2012	219,53	5722,01	0,0015	-0,0112		
229	15.11.2012	221,01	5677,75	0,0067	-0,0078		
230	16.11.2012	216,34	5605,59	-0,0214	-0,0128		
231	19.11.2012	230,71	5737,66	0,0643	0,0233		
232	20.11.2012	227,70	5748,10	-0,0131	0,0018		
233	21.11.2012	229,87	5752,03	0,0095	0,0007		
234	22.11.2012	232,78	5791,03	0,0126	0,0068		
235	23.11.2012	234,82	5819,14	0,0087	0,0048		
236	26.11.2012	222,16	5786,72	-0,0554	-0,0056		
237	27.11.2012	225,07	5799,71	0,0130	0,0022		
238	28.11.2012	223,68	5803,28	-0,0062	0,0006		
239	29.11.2012	225,95	5870,30	0,0101	0,0115		
240	30.11.2012	227,24	5866,82	0,0057	-0,0006		
241	03.12.2012	225,76	5871,24	-0,0065	0,0008		
242	04.12.2012	225,21	5869,04	-0,0024	-0,0004		
243	05.12.2012	227,61	5892,08	0,0106	0,0039		
244	06.12.2012	231,40	5901,42	0,0165	0,0016		
245	07.12.2012	232,37	5914,40	0,0042	0,0022		
246	10.12.2012	230,52	5921,63	-0,0080	0,0012		
247	11.12.2012	229,97	5924,97	-0,0024	0,0006		
248	12.12.2012	233,34	5945,85	0,0145	0,0035		
249	13.12.2012	234,72	5929,61	0,0059	-0,0027		
250	14.12.2012	236,11	5921,76	0,0059	-0,0013		
251	17.12.2012	237,31	5912,15	0,0051	-0,0016		
252	18.12.2012	241,24	5935,90	0,0164	0,0040		
253	19.12.2012	246,22	5961,59	0,0204	0,0043		
254	20.12.2012	246,46	5958,34	0,0010	-0,0005		
255	21.12.2012	242,95	5939,99	-0,0143	-0,0031		
256	24.12.2012	243,04	5954,18	0,0004	0,0024		
257	25.12.2012	243,04	5954,18	0,0000	0,0000		

Event 4b : RBS Fine

event_id	Date	RBS	FTSE	Ri2	Rm2	Rexp2	AR2
1	10.08.2012	222,80	5847,11				
2	13.08.2012	222,40	5831,88	-0,0018	-0,0026		
3	14.08.2012	223,50	5864,78	0,0049	0,0056		
4	15.08.2012	221,60	5833,04	-0,0085	-0,0054		
5	16.08.2012	227,30	5834,51	0,0254	0,0003		
6	17.08.2012	231,60	5852,42	0,0187	0,0031		
7	20.08.2012	231,70	5824,37	0,0004	-0,0048		
8	21.08.2012	237,50	5857,52	0,0247	0,0057		
9	22.08.2012	235,60	5774,20	-0,0080	-0,0143		
10	23.08.2012	227,90	5776,60	-0,0332	0,0004		
11	24.08.2012	222,90	5776,60	-0,0222	0,0000		
12	27.08.2012	222,90	5776,60	0,0000	0,0000		
13	28.08.2012	223,90	5775,71	0,0045	-0,0002		
14	29.08.2012	222,10	5743,53	-0,0081	-0,0056		
15	30.08.2012	223,00	5719,45	0,0040	-0,0042		
16	31.08.2012	226,30	5711,48	0,0147	-0,0014		
17	03.09.2012	226,50	5758,41	0,0009	0,0082		
18	04.09.2012	220,70	5672,01	-0,0259	-0,0151		
19	05.09.2012	222,90	5657,86	0,0099	-0,0025		
20	06.09.2012	233,50	5777,34	0,0465	0,0209		
21	07.09.2012	244,50	5794,80	0,0460	0,0030		
22	10.09.2012	253,00	5793,20	0,0342	-0,0003		
23	11.09.2012	264,70	5792,19	0,0452	-0,0002		
24	12.09.2012	274,70	5782,08	0,0371	-0,0017		
25	13.09.2012	273,90	5819,92	-0,0029	0,0065		
26	14.09.2012	279,00	5915,55	0,0184	0,0163		
27	17.09.2012	274,40	5893,52	-0,0166	-0,0037		
28	18.09.2012	267,10	5868,16	-0,0270	-0,0043		
29	19.09.2012	268,40	5888,48	0,0049	0,0035		
30	20.09.2012	268,50	5854,64	0,0004	-0,0058		
31	21.09.2012	275,80	5852,62	0,0268	-0,0003		
32	24.09.2012	271,50	5838,84	-0,0157	-0,0024		
33	25.09.2012	270,00	5859,71	-0,0055	0,0036		
34	26.09.2012	255,10	5768,09	-0,0568	-0,0158		
35	27.09.2012	256,60	5779,42	0,0059	0,0020		
36	28.09.2012	257,00	5742,07	0,0016	-0,0065		
37	01.10.2012	266,40	5820,45	0,0359	0,0136		
38	02.10.2012	257,50	5809,45	-0,0340	-0,0019		
39	03.10.2012	258,10	5825,81	0,0023	0,0028		
40	04.10.2012	259,80	5827,78	0,0066	0,0003		
41	05.10.2012	263,50	5871,02	0,0141	0,0074		
42	08.10.2012	258,00	5841,74	-0,0211	-0,0050		

43	09.10.2012	257,30	5810,25	-0,0027	-0,0054		
44	10.10.2012	262,70	5776,71	0,0208	-0,0058		
45	11.10.2012	273,80	5829,75	0,0414	0,0091		
46	12.10.2012	270,90	5793,32	-0,0106	-0,0063		
47	15.10.2012	268,10	5805,61	-0,0104	0,0021		
48	16.10.2012	280,00	5870,54	0,0434	0,0111		
49	17.10.2012	286,10	5910,91	0,0216	0,0069		
50	18.10.2012	287,00	5917,05	0,0031	0,0010		
51	19.10.2012	281,00	5896,15	-0,0211	-0,0035		
52	22.10.2012	281,50	5882,91	0,0018	-0,0022		
53	23.10.2012	277,70	5797,91	-0,0136	-0,0146		
54	24.10.2012	279,00	5804,78	0,0047	0,0012		
55	25.10.2012	278,30	5805,05	-0,0025	0,0000		
56	26.10.2012	277,70	5806,71	-0,0022	0,0003		
57	29.10.2012	276,20	5795,10	-0,0054	-0,0020		
58	30.10.2012	280,80	5849,90	0,0165	0,0094		
59	31.10.2012	276,00	5782,70	-0,0172	-0,0116		
60	01.11.2012	287,20	5861,92	0,0398	0,0136		
61	02.11.2012	281,30	5868,55	-0,0208	0,0011		
62	05.11.2012	276,50	5839,06	-0,0172	-0,0050		
63	06.11.2012	280,20	5884,90	0,0133	0,0078		
64	07.11.2012	272,60	5791,63	-0,0275	-0,0160		
65	08.11.2012	274,40	5776,05	0,0066	-0,0027		
66	09.11.2012	270,10	5769,68	-0,0158	-0,0011		
67	12.11.2012	274,50	5767,27	0,0162	-0,0004		
68	13.11.2012	277,60	5786,25	0,0112	0,0033		
69	14.11.2012	277,70	5722,01	0,0004	-0,0112		
70	15.11.2012	282,20	5677,75	0,0161	-0,0078		
71	16.11.2012	277,40	5605,59	-0,0172	-0,0128		
72	19.11.2012	287,30	5737,66	0,0351	0,0233		
73	20.11.2012	288,60	5748,10	0,0045	0,0018		
74	21.11.2012	288,80	5752,03	0,0007	0,0007		
75	22.11.2012	292,70	5791,03	0,0134	0,0068		
76	23.11.2012	294,00	5819,14	0,0044	0,0048		
77	26.11.2012	285,10	5786,72	-0,0307	-0,0056		
78	27.11.2012	295,10	5799,71	0,0345	0,0022		
79	28.11.2012	294,60	5803,28	-0,0017	0,0006		
80	29.11.2012	299,00	5870,30	0,0148	0,0115		
81	30.11.2012	295,20	5866,82	-0,0128	-0,0006		
82	03.12.2012	292,60	5871,24	-0,0088	0,0008		
83	04.12.2012	295,70	5869,04	0,0105	-0,0004		
84	05.12.2012	297,20	5892,08	0,0051	0,0039		
85	06.12.2012	300,30	5901,42	0,0104	0,0016		
86	07.12.2012	299,00	5914,40	-0,0043	0,0022		
87	10.12.2012	297,80	5921,63	-0,0040	0,0012	0,0051	-0,0092

88	11.12.2012	297,70	5924,97	-0,0003	0,0006	0,0040	-0,0043
89	12.12.2012	301,40	5945,85	0,0124	0,0035	0,0092	0,0032
90	13.12.2012	300,20	5929,61	-0,0040	-0,0027	-0,0018	-0,0022
91	14.12.2012	302,30	5921,76	0,0070	-0,0013	0,0007	0,0063
92	17.12.2012	301,70	5912,15	-0,0020	-0,0016	0,0001	-0,0021
93	18.12.2012	305,10	5935,90	0,0112	0,0040	0,0100	0,0012
94	19.12.2012	315,40	5961,59	0,0332	0,0043	0,0106	0,0226
95	20.12.2012	317,70	5958,34	0,0073	-0,0005	0,0020	0,0052
96	21.12.2012	315,20	5939,99	-0,0079	-0,0031	-0,0024	-0,0055
97	24.12.2012	317,00	5954,18	0,0057	0,0024	0,0072	-0,0015
98	25.12.2012	317,00	5954,18	0,0000	0,0000	0,0030	-0,0030
99	26.12.2012	317,00	5954,18	0,0000	0,0000	0,0030	-0,0030
100	27.12.2012	325,00	5954,30	0,0249	0,0000	0,0030	0,0219
101	28.12.2012	324,70	5925,37	-0,0009	-0,0049	-0,0056	0,0046
102	31.12.2012	324,50	5897,81	-0,0006	-0,0047	-0,0052	0,0046
103	01.01.2013	324,50	5897,81	0,0000	0,0000	0,0030	-0,0030
104	02.01.2013	334,20	6027,37	0,0295	0,0217	0,0412	-0,0117
105	03.01.2013	332,40	6047,34	-0,0054	0,0033	0,0088	-0,0142
106	04.01.2013	333,80	6089,84	0,0042	0,0070	0,0153	-0,0111
107	07.01.2013	333,90	6064,58	0,0003	-0,0042	-0,0043	0,0046
108	08.01.2013	337,00	6053,63	0,0092	-0,0018	-0,0002	0,0094
109	09.01.2013	349,90	6098,65	0,0376	0,0074	0,0160	0,0216
110	10.01.2013	356,80	6101,51	0,0195	0,0005	0,0038	0,0157
111	11.01.2013	360,40	6121,58	0,0100	0,0033	0,0088	0,0013
112	14.01.2013	364,50	6107,86	0,0113	-0,0022	-0,0009	0,0123
113	15.01.2013	354,10	6117,31	-0,0289	0,0015	0,0057	-0,0347
114	16.01.2013	350,10	6103,98	-0,0114	-0,0022	-0,0008	-0,0105
115	17.01.2013	353,80	6132,36	0,0105	0,0046	0,0111	-0,0006
116	18.01.2013	358,80	6154,41	0,0140	0,0036	0,0093	0,0047
117	21.01.2013	366,90	6180,98	0,0223	0,0043	0,0106	0,0118
118	22.01.2013	362,90	6179,17	-0,0110	-0,0003	0,0025	-0,0134
119	23.01.2013	359,00	6197,64	-0,0108	0,0030	0,0082	-0,0190
120	24.01.2013	365,00	6264,91	0,0166	0,0108	0,0220	-0,0054
121	25.01.2013	365,90	6284,45	0,0025	0,0031	0,0085	-0,0060
122	28.01.2013	367,80	6294,41	0,0052	0,0016	0,0058	-0,0006
123	29.01.2013	345,80	6339,19	-0,0617	0,0071	0,0154	-0,0771
124	30.01.2013	347,20	6323,11	0,0040	-0,0025	-0,0015	0,0055
125	31.01.2013	343,30	6276,88	-0,0113	-0,0073	-0,0099	-0,0014
126	01.02.2013	340,50	6347,24	-0,0082	0,0111	0,0226	-0,0308
127	04.02.2013	328,60	6246,84	-0,0356	-0,0159	-0,0250	-0,0106
128	05.02.2013	337,50	6282,76	0,0267	0,0057	0,0131	0,0137
129	06.02.2013	342,10	6295,34	0,0135	0,0020	0,0065	0,0070
130	07.02.2013	332,90	6228,42	-0,0273	-0,0107	-0,0158	-0,0115
131	08.02.2013	339,10	6263,93	0,0185	0,0057	0,0130	0,0055
132	11.02.2013	340,30	6277,06	0,0035	0,0021	0,0067	-0,0031

133	12.02.2013	354,20	6338,38	0,0400	0,0097	0,0201	0,0200
134	13.02.2013	352,90	6359,11	-0,0037	0,0033	0,0087	-0,0124
135	14.02.2013	347,90	6327,36	-0,0143	-0,0050	-0,0058	-0,0085
136	15.02.2013	344,20	6328,26	-0,0107	0,0001	0,0033	-0,0139
137	18.02.2013	339,30	6318,19	-0,0143	-0,0016	0,0002	-0,0145
138	19.02.2013	345,10	6379,07	0,0170	0,0096	0,0198	-0,0029
139	20.02.2013	354,10	6395,37	0,0257	0,0026	0,0075	0,0183
140	21.02.2013	346,50	6291,54	-0,0217	-0,0164	-0,0257	0,0040
141	22.02.2013	345,00	6335,70	-0,0043	0,0070	0,0153	-0,0196
142	25.02.2013	354,80	6355,37	0,0280	0,0031	0,0084	0,0196
143	26.02.2013	339,50	6270,44	-0,0441	-0,0135	-0,0206	-0,0235
144	27.02.2013	346,80	6325,88	0,0213	0,0088	0,0185	0,0028
145	28.02.2013	323,90	6360,81	-0,0683	0,0055	0,0127	-0,0810
146	01.03.2013	314,00	6378,60	-0,0310	0,0028	0,0079	-0,0389
147	04.03.2013	306,90	6345,63	-0,0229	-0,0052	-0,0061	-0,0168
148	05.03.2013	312,80	6431,95	0,0190	0,0135	0,0267	-0,0077
149	06.03.2013	309,10	6427,64	-0,0119	-0,0007	0,0018	-0,0137
150	07.03.2013	303,20	6439,16	-0,0193	0,0018	0,0061	-0,0254
151	08.03.2013	306,20	6483,58	0,0098	0,0069	0,0151	-0,0052
152	11.03.2013	301,30	6503,63	-0,0161	0,0031	0,0084	-0,0246
153	12.03.2013	306,30	6510,62	0,0165	0,0011	0,0049	0,0116
154	13.03.2013	300,10	6481,50	-0,0204	-0,0045	-0,0049	-0,0156
155	14.03.2013	304,50	6529,41	0,0146	0,0074	0,0159	-0,0014
156	15.03.2013	307,90	6489,65	0,0111	-0,0061	-0,0077	0,0188
157	18.03.2013	297,30	6457,92	-0,0350	-0,0049	-0,0056	-0,0294
158	19.03.2013	293,60	6441,32	-0,0125	-0,0026	-0,0015	-0,0110
159	20.03.2013	300,20	6432,70	0,0222	-0,0013	0,0006	0,0216
160	21.03.2013	300,50	6388,55	0,0010	-0,0069	-0,0091	0,0101
161	22.03.2013	293,30	6392,76	-0,0243	0,0007	0,0042	-0,0284
162	25.03.2013	287,20	6378,38	-0,0210	-0,0023	-0,0010	-0,0201
163	26.03.2013	286,00	6399,37	-0,0042	0,0033	0,0088	-0,0130
164	27.03.2013	277,10	6387,56	-0,0316	-0,0018	-0,0002	-0,0314
165	28.03.2013	275,50	6411,74	-0,0058	0,0038	0,0096	-0,0154
166	29.03.2013	275,50	6411,74	0,0000	0,0000	0,0030	-0,0030
167	01.04.2013	275,50	6411,74	0,0000	0,0000	0,0030	-0,0030
168	02.04.2013	283,70	6490,66	0,0293	0,0122	0,0245	0,0048
169	03.04.2013	271,10	6420,28	-0,0454	-0,0109	-0,0161	-0,0293
170	04.04.2013	274,40	6344,12	0,0121	-0,0119	-0,0180	0,0301
171	05.04.2013	269,50	6249,78	-0,0180	-0,0150	-0,0233	0,0053
172	08.04.2013	266,10	6276,94	-0,0127	0,0043	0,0106	-0,0233
173	09.04.2013	273,90	6313,21	0,0289	0,0058		
174	10.04.2013	285,40	6387,37	0,0411	0,0117		
175	11.04.2013	287,20	6416,14	0,0063	0,0045		
176	12.04.2013	285,00	6384,39	-0,0077	-0,0050		
177	15.04.2013	280,30	6343,60	-0,0166	-0,0064		

178	16.04.2013	283,80	6304,58	0,0124	-0,0062		
179	17.04.2013	283,20	6244,21	-0,0021	-0,0096		
180	18.04.2013	273,90	6243,67	-0,0334	-0,0001		
181	19.04.2013	280,50	6286,59	0,0238	0,0069		
182	22.04.2013	286,20	6280,62	0,0201	-0,0010		
183	23.04.2013	293,00	6406,12	0,0235	0,0198		
184	24.04.2013	296,40	6431,76	0,0115	0,0040		
185	25.04.2013	300,70	6442,59	0,0144	0,0017		
186	26.04.2013	295,10	6426,42	-0,0188	-0,0025		
187	29.04.2013	294,00	6458,02	-0,0037	0,0049		
188	30.04.2013	306,30	6430,12	0,0410	-0,0043		
189	01.05.2013	306,80	6451,29	0,0016	0,0033		
190	02.05.2013	307,30	6460,71	0,0016	0,0015		
191	03.05.2013	289,80	6521,46	-0,0586	0,0094		
192	06.05.2013	289,80	6521,46	0,0000	0,0000		
193	07.05.2013	289,60	6557,30	-0,0007	0,0055		
194	08.05.2013	285,40	6583,48	-0,0146	0,0040		
195	09.05.2013	293,80	6592,74	0,0290	0,0014		
196	10.05.2013	299,50	6624,98	0,0192	0,0049		
197	13.05.2013	297,40	6631,76	-0,0070	0,0010		
198	14.05.2013	302,50	6686,06	0,0170	0,0082		
199	15.05.2013	307,00	6693,55	0,0148	0,0011		
200	16.05.2013	318,80	6687,80	0,0377	-0,0009		
201	17.05.2013	336,80	6723,06	0,0549	0,0053		
202	20.05.2013	351,90	6755,63	0,0439	0,0048		
203	21.05.2013	342,20	6803,87	-0,0280	0,0071		
204	22.05.2013	349,60	6840,27	0,0214	0,0053		
205	23.05.2013	337,20	6696,79	-0,0361	-0,0212		
206	24.05.2013	327,00	6654,34	-0,0307	-0,0064		
207	27.05.2013	327,00	6654,34	0,0000	0,0000		
208	28.05.2013	332,30	6762,01	0,0161	0,0161		
209	29.05.2013	326,00	6627,17	-0,0191	-0,0201		
210	30.05.2013	331,50	6656,99	0,0167	0,0045		
211	31.05.2013	336,60	6583,09	0,0153	-0,0112		
212	03.06.2013	332,60	6525,12	-0,0120	-0,0088		
213	04.06.2013	335,40	6558,58	0,0084	0,0051		
214	05.06.2013	328,40	6419,31	-0,0211	-0,0215		
215	06.06.2013	316,90	6336,11	-0,0356	-0,0130		
216	07.06.2013	327,40	6411,99	0,0326	0,0119		
217	10.06.2013	334,00	6400,45	0,0200	-0,0018		
218	11.06.2013	327,50	6340,08	-0,0197	-0,0095		
219	12.06.2013	325,60	6299,45	-0,0058	-0,0064		
220	13.06.2013	315,00	6304,63	-0,0331	0,0008		
221	14.06.2013	316,00	6308,26	0,0032	0,0006		
222	17.06.2013	316,00	6330,49	0,0000	0,0035		

223	18.06.2013	323,00	6374,21	0,0219	0,0069		
224	19.06.2013	319,50	6348,82	-0,0109	-0,0040		
225	20.06.2013	303,70	6159,51	-0,0507	-0,0303		
226	21.06.2013	281,70	6116,17	-0,0752	-0,0071		
227	24.06.2013	280,90	6029,10	-0,0028	-0,0143		
228	25.06.2013	281,50	6101,91	0,0021	0,0120		
229	26.06.2013	280,30	6165,48	-0,0043	0,0104		
230	27.06.2013	275,80	6243,40	-0,0162	0,0126		
231	28.06.2013	273,50	6215,47	-0,0084	-0,0045		
232	01.07.2013	281,90	6307,78	0,0303	0,0147		
233	02.07.2013	274,30	6303,94	-0,0273	-0,0006		
234	03.07.2013	270,00	6229,87	-0,0158	-0,0118		
235	04.07.2013	284,10	6421,67	0,0509	0,0303		
236	05.07.2013	276,70	6375,52	-0,0264	-0,0072		
237	08.07.2013	288,80	6450,07	0,0428	0,0116		
238	09.07.2013	304,40	6513,08	0,0526	0,0097		
239	10.07.2013	301,30	6504,96	-0,0102	-0,0012		
240	11.07.2013	304,00	6543,41	0,0089	0,0059		
241	12.07.2013	304,40	6544,94	0,0013	0,0002		
242	15.07.2013	320,00	6586,11	0,0500	0,0063		
243	16.07.2013	319,10	6556,35	-0,0028	-0,0045		
244	17.07.2013	321,60	6571,93	0,0078	0,0024		
245	18.07.2013	334,40	6634,36	0,0390	0,0095		
246	19.07.2013	337,10	6630,67	0,0080	-0,0006		
247	22.07.2013	334,90	6623,17	-0,0065	-0,0011		
248	23.07.2013	335,80	6597,44	0,0027	-0,0039		
249	24.07.2013	341,20	6620,43	0,0160	0,0035		
250	25.07.2013	338,10	6587,95	-0,0091	-0,0049		
251	26.07.2013	328,00	6554,79	-0,0303	-0,0050		
252	29.07.2013	325,60	6560,25	-0,0073	0,0008		
253	30.07.2013	317,40	6570,95	-0,0255	0,0016		
254	31.07.2013	317,60	6621,06	0,0006	0,0076		
255	01.08.2013	333,50	6681,98	0,0489	0,0092		
256	02.08.2013	322,50	6647,87	-0,0335	-0,0051		
257	05.08.2013	317,40	6619,58	-0,0159	-0,0043		
258	06.08.2013	317,70	6604,21	0,0009	-0,0023		
259	07.08.2013	320,90	6511,21	0,0100	-0,0142		

Event 4c : UBS Conviction

event_id	Date	UBS	NYSECOMPOSITE	Ri3	Rm3	Rexp3	AR3
1	05.03.2012	13,89	8091,27				
2	06.03.2012	13,53	7920,14	-0,0263	-0,0214		
3	07.03.2012	13,78	7979,78	0,0183	0,0075		
4	08.03.2012	14,08	8082,37	0,0215	0,0128		
5	09.03.2012	14,46	8102,10	0,0266	0,0024		
6	12.03.2012	14,50	8086,28	0,0028	-0,0020		
7	13.03.2012	14,55	8234,47	0,0034	0,0182		
8	14.03.2012	14,51	8185,31	-0,0028	-0,0060		
9	15.03.2012	14,39	8246,72	-0,0083	0,0075		
10	16.03.2012	14,37	8270,41	-0,0014	0,0029		
11	19.03.2012	14,81	8297,47	0,0302	0,0033		
12	20.03.2012	15,37	8241,28	0,0371	-0,0068		
13	21.03.2012	15,43	8219,34	0,0039	-0,0027		
14	22.03.2012	15,63	8141,33	0,0129	-0,0095		
15	23.03.2012	15,70	8180,06	0,0045	0,0047		
16	26.03.2012	15,90	8288,79	0,0127	0,0132		
17	27.03.2012	15,99	8239,37	0,0056	-0,0060		
18	28.03.2012	15,99	8188,35	0,0000	-0,0062		
19	29.03.2012	16,06	8166,37	0,0044	-0,0027		
20	30.03.2012	15,93	8206,93	-0,0081	0,0050		
21	02.04.2012	15,73	8280,83	-0,0126	0,0090		
22	03.04.2012	15,72	8216,54	-0,0006	-0,0078		
23	04.04.2012	15,42	8106,79	-0,0193	-0,0134		
24	05.04.2012	15,56	8081,35	0,0090	-0,0031		
25	06.04.2012	15,56	8081,35	0,0000	0,0000		
26	09.04.2012	15,51	7992,32	-0,0032	-0,0111		
27	10.04.2012	15,14	7841,92	-0,0241	-0,0190		
28	11.04.2012	15,00	7912,85	-0,0093	0,0090		
29	12.04.2012	15,20	8039,96	0,0132	0,0159		
30	13.04.2012	15,09	7931,10	-0,0073	-0,0136		
31	16.04.2012	14,73	7949,57	-0,0241	0,0023		
32	17.04.2012	14,95	8064,08	0,0148	0,0143		
33	18.04.2012	15,08	8030,37	0,0087	-0,0042		
34	19.04.2012	15,21	7995,92	0,0086	-0,0043		
35	20.04.2012	15,13	8025,53	-0,0053	0,0037		
36	23.04.2012	15,03	7940,74	-0,0066	-0,0106		
37	24.04.2012	14,69	7988,02	-0,0229	0,0059		
38	25.04.2012	14,98	8070,78	0,0195	0,0103		
39	26.04.2012	15,10	8123,07	0,0080	0,0065		
40	27.04.2012	15,18	8151,91	0,0053	0,0035		
41	30.04.2012	15,21	8119,07	0,0020	-0,0040		
42	01.05.2012	15,26	8164,04	0,0033	0,0055		

43	02.05.2012	15,15	8124,33	-0,0072	-0,0049		
44	03.05.2012	15,26	8049,89	0,0072	-0,0092		
45	04.05.2012	15,35	7933,30	0,0059	-0,0146		
46	07.05.2012	15,48	7948,77	0,0084	0,0019		
47	08.05.2012	15,17	7887,26	-0,0202	-0,0078		
48	09.05.2012	15,18	7820,26	0,0007	-0,0085		
49	10.05.2012	15,39	7852,75	0,0137	0,0041		
50	11.05.2012	15,05	7815,89	-0,0223	-0,0047		
51	14.05.2012	14,84	7705,45	-0,0141	-0,0142		
52	15.05.2012	14,41	7635,81	-0,0294	-0,0091		
53	16.05.2012	14,20	7592,82	-0,0147	-0,0056		
54	17.05.2012	13,66	7480,43	-0,0388	-0,0149		
55	18.05.2012	12,77	7427,74	-0,0674	-0,0071		
56	21.05.2012	13,22	7542,98	0,0346	0,0154		
57	22.05.2012	13,08	7542,58	-0,0106	-0,0001		
58	23.05.2012	12,90	7540,90	-0,0139	-0,0002		
59	24.05.2012	12,94	7552,36	0,0031	0,0015		
60	25.05.2012	12,80	7534,33	-0,0109	-0,0024		
61	28.05.2012	12,80	7534,33	0,0000	0,0000		
62	29.05.2012	13,52	7615,04	0,0547	0,0107		
63	30.05.2012	13,31	7471,40	-0,0157	-0,0190		
64	31.05.2012	13,39	7463,96	0,0060	-0,0010		
65	01.06.2012	13,14	7292,23	-0,0188	-0,0233		
66	04.06.2012	13,33	7285,53	0,0144	-0,0009		
67	05.06.2012	13,39	7338,63	0,0045	0,0073		
68	06.06.2012	13,54	7517,46	0,0111	0,0241		
69	07.06.2012	13,57	7519,83	0,0022	0,0003		
70	08.06.2012	13,69	7553,78	0,0088	0,0045		
71	11.06.2012	13,52	7459,27	-0,0125	-0,0126		
72	12.06.2012	13,51	7557,82	-0,0007	0,0131		
73	13.06.2012	13,37	7506,42	-0,0104	-0,0068		
74	14.06.2012	13,34	7582,83	-0,0022	0,0101		
75	15.06.2012	13,10	7664,27	-0,0182	0,0107		
76	18.06.2012	13,07	7662,29	-0,0023	-0,0003		
77	19.06.2012	13,15	7766,26	0,0061	0,0135		
78	20.06.2012	13,22	7757,92	0,0053	-0,0011		
79	21.06.2012	13,14	7566,11	-0,0061	-0,0250		
80	22.06.2012	13,84	7616,59	0,0519	0,0067		
81	25.06.2012	14,02	7491,87	0,0129	-0,0165		
82	26.06.2012	14,40	7527,09	0,0267	0,0047		
83	27.06.2012	14,44	7598,05	0,0028	0,0094		
84	28.06.2012	14,80	7597,52	0,0246	-0,0001		
85	29.06.2012	15,30	7801,84	0,0332	0,0265		
86	02.07.2012	15,56	7832,23	0,0169	0,0039		
87	03.07.2012	15,93	7901,67	0,0235	0,0088	0,0153	0,0082

88	04.07.2012	15,93	7901,67	0,0000	0,0000	0,0080	-0,0080
89	05.07.2012	15,76	7837,78	-0,0107	-0,0081	0,0013	-0,0120
90	06.07.2012	15,89	7756,62	0,0082	-0,0104	-0,0006	0,0088
91	09.07.2012	15,76	7736,34	-0,0082	-0,0026	0,0058	-0,0140
92	10.07.2012	15,68	7667,57	-0,0051	-0,0089	0,0006	-0,0057
93	11.07.2012	15,44	7685,37	-0,0154	0,0023	0,0099	-0,0253
94	12.07.2012	15,50	7638,65	0,0039	-0,0061	0,0029	0,0009
95	13.07.2012	15,79	7758,68	0,0185	0,0156	0,0209	-0,0024
96	16.07.2012	15,94	7743,02	0,0095	-0,0020	0,0063	0,0031
97	17.07.2012	15,77	7794,77	-0,0107	0,0067	0,0135	-0,0242
98	18.07.2012	15,67	7831,09	-0,0064	0,0046	0,0119	-0,0182
99	19.07.2012	15,90	7849,75	0,0146	0,0024	0,0100	0,0046
100	20.07.2012	15,94	7759,59	0,0025	-0,0116	-0,0016	0,0041
101	23.07.2012	16,04	7670,54	0,0063	-0,0115	-0,0016	0,0078
102	24.07.2012	15,93	7590,62	-0,0069	-0,0105	-0,0007	-0,0062
103	25.07.2012	15,91	7607,56	-0,0013	0,0022	0,0098	-0,0111
104	26.07.2012	15,52	7754,51	-0,0248	0,0191	0,0239	-0,0487
105	27.07.2012	15,57	7912,17	0,0032	0,0201	0,0247	-0,0215
106	30.07.2012	15,59	7911,05	0,0013	-0,0001	0,0079	-0,0066
107	31.07.2012	15,60	7863,94	0,0006	-0,0060	0,0030	-0,0024
108	01.08.2012	15,36	7840,78	-0,0155	-0,0029	0,0056	-0,0211
109	02.08.2012	15,17	7765,60	-0,0124	-0,0096	0,0000	-0,0125
110	03.08.2012	15,43	7939,55	0,0170	0,0222	0,0264	-0,0094
111	06.08.2012	15,59	7964,10	0,0103	0,0031	0,0106	-0,0002
112	07.08.2012	15,59	8017,71	0,0000	0,0067	0,0136	-0,0136
113	08.08.2012	15,26	8018,24	-0,0214	0,0001	0,0081	-0,0294
114	09.08.2012	15,01	8025,01	-0,0165	0,0008	0,0087	-0,0252
115	10.08.2012	15,14	8044,76	0,0086	0,0025	0,0100	-0,0014
116	13.08.2012	14,93	8018,64	-0,0140	-0,0033	0,0053	-0,0193
117	14.08.2012	14,95	8019,53	0,0013	0,0001	0,0081	-0,0068
118	15.08.2012	15,15	8029,01	0,0133	0,0012	0,0090	0,0043
119	16.08.2012	15,14	8090,00	-0,0007	0,0076	0,0143	-0,0149
120	17.08.2012	15,05	8102,08	-0,0060	0,0015	0,0092	-0,0152
121	20.08.2012	15,43	8094,33	0,0249	-0,0010	0,0072	0,0177
122	21.08.2012	15,25	8082,68	-0,0117	-0,0014	0,0068	-0,0185
123	22.08.2012	15,29	8074,23	0,0026	-0,0010	0,0071	-0,0045
124	23.08.2012	15,63	8011,44	0,0220	-0,0078	0,0015	0,0205
125	24.08.2012	15,19	8047,87	-0,0286	0,0045	0,0118	-0,0403
126	27.08.2012	15,20	8036,25	0,0007	-0,0014	0,0068	-0,0061
127	28.08.2012	15,13	8033,85	-0,0046	-0,0003	0,0078	-0,0124
128	29.08.2012	15,26	8031,65	0,0086	-0,0003	0,0078	0,0008
129	30.08.2012	15,41	7966,24	0,0098	-0,0082	0,0012	0,0086
130	31.08.2012	15,40	8014,93	-0,0006	0,0061	0,0131	-0,0137
131	03.09.2012	15,40	8014,93	0,0000	0,0000	0,0080	-0,0080
132	04.09.2012	15,56	8002,31	0,0103	-0,0016	0,0067	0,0036

133	05.09.2012	15,82	7992,01	0,0166	-0,0013	0,0069	0,0096
134	06.09.2012	15,88	8160,56	0,0038	0,0209	0,0253	-0,0215
135	07.09.2012	15,99	8234,51	0,0069	0,0090	0,0155	-0,0086
136	10.09.2012	15,72	8192,40	-0,0170	-0,0051	0,0038	-0,0208
137	11.09.2012	15,35	8246,15	-0,0238	0,0065	0,0134	-0,0372
138	12.09.2012	15,92	8267,32	0,0365	0,0026	0,0101	0,0263
139	13.09.2012	15,74	8407,03	-0,0114	0,0168	0,0219	-0,0333
140	14.09.2012	15,74	8458,88	0,0000	0,0061	0,0131	-0,0131
141	17.09.2012	15,82	8408,97	0,0051	-0,0059	0,0031	0,0020
142	18.09.2012	15,89	8387,44	0,0044	-0,0026	0,0059	-0,0015
143	19.09.2012	15,87	8400,49	-0,0013	0,0016	0,0093	-0,0105
144	20.09.2012	15,88	8372,91	0,0006	-0,0033	0,0053	-0,0046
145	21.09.2012	15,90	8377,51	0,0013	0,0005	0,0085	-0,0072
146	24.09.2012	15,55	8356,56	-0,0223	-0,0025	0,0059	-0,0282
147	25.09.2012	15,79	8274,78	0,0153	-0,0098	-0,0002	0,0155
148	26.09.2012	15,72	8221,32	-0,0044	-0,0065	0,0026	-0,0071
149	27.09.2012	15,77	8303,74	0,0032	0,0100	0,0163	-0,0131
150	28.09.2012	15,60	8251,00	-0,0108	-0,0064	0,0027	-0,0136
151	01.10.2012	15,75	8284,37	0,0096	0,0040	0,0113	-0,0018
152	02.10.2012	15,79	8295,11	0,0025	0,0013	0,0091	-0,0065
153	03.10.2012	15,85	8297,50	0,0038	0,0003	0,0082	-0,0044
154	04.10.2012	15,84	8376,34	-0,0006	0,0095	0,0158	-0,0165
155	05.10.2012	15,75	8384,07	-0,0057	0,0009	0,0088	-0,0145
156	08.10.2012	15,39	8359,12	-0,0231	-0,0030	0,0055	-0,0287
157	09.10.2012	15,30	8279,11	-0,0059	-0,0096	0,0000	-0,0059
158	10.10.2012	15,65	8229,17	0,0226	-0,0061	0,0030	0,0196
159	11.10.2012	15,70	8256,59	0,0032	0,0033	0,0108	-0,0076
160	12.10.2012	15,67	8227,08	-0,0019	-0,0036	0,0050	-0,0069
161	15.10.2012	15,58	8293,50	-0,0058	0,0080	0,0147	-0,0204
162	16.10.2012	15,39	8386,47	-0,0123	0,0111	0,0172	-0,0295
163	17.10.2012	15,38	8446,52	-0,0007	0,0071	0,0139	-0,0146
164	18.10.2012	15,60	8442,81	0,0142	-0,0004	0,0076	0,0066
165	19.10.2012	15,72	8324,15	0,0077	-0,0142	-0,0037	0,0114
166	22.10.2012	15,74	8329,19	0,0013	0,0006	0,0085	-0,0072
167	23.10.2012	15,80	8195,31	0,0038	-0,0162	-0,0054	0,0092
168	24.10.2012	15,57	8179,26	-0,0147	-0,0020	0,0064	-0,0210
169	25.10.2012	15,46	8211,91	-0,0071	0,0040	0,0113	-0,0184
170	26.10.2012	15,78	8190,20	0,0205	-0,0026	0,0058	0,0147
171	29.10.2012	15,78	8190,20	0,0000	0,0000	0,0080	-0,0080
172	30.10.2012	15,78	8190,20	0,0000	0,0000	0,0080	-0,0080
173	31.10.2012	15,92	8221,40	0,0088	0,0038		
174	01.11.2012	16,01	8311,36	0,0056	0,0109		
175	02.11.2012	16,01	8234,91	0,0000	-0,0092		
176	05.11.2012	15,96	8240,26	-0,0031	0,0006		
177	06.11.2012	16,00	8312,35	0,0025	0,0087		

178	07.11.2012	15,97	8138,81	-0,0019	-0,0211		
179	08.11.2012	16,01	8050,83	0,0025	-0,0109		
180	09.11.2012	16,00	8053,57	-0,0006	0,0003		
181	12.11.2012	16,06	8054,07	0,0037	0,0001		
182	13.11.2012	16,30	8023,23	0,0148	-0,0038		
183	14.11.2012	15,93	7903,42	-0,0230	-0,0150		
184	15.11.2012	15,90	7896,88	-0,0019	-0,0008		
185	16.11.2012	15,90	7931,55	0,0000	0,0044		
186	19.11.2012	16,07	8080,29	0,0106	0,0186		
187	20.11.2012	16,00	8086,42	-0,0044	0,0008		
188	21.11.2012	15,90	8112,18	-0,0063	0,0032		
189	22.11.2012	15,90	8112,18	0,0000	0,0000		
190	23.11.2012	16,00	8225,51	0,0063	0,0139		
191	26.11.2012	15,84	8197,57	-0,0101	-0,0034		
192	27.11.2012	15,78	8150,79	-0,0038	-0,0057		
193	28.11.2012	15,81	8207,36	0,0019	0,0069		
194	29.11.2012	15,80	8256,07	-0,0006	0,0059		
195	30.11.2012	15,86	8260,43	0,0038	0,0005		
196	03.12.2012	15,86	8223,54	0,0000	-0,0045		
197	04.12.2012	15,86	8223,87	0,0000	0,0000		
198	05.12.2012	15,79	8264,80	-0,0044	0,0050		
199	06.12.2012	15,59	8280,93	-0,0127	0,0020		
200	07.12.2012	15,53	8314,29	-0,0039	0,0040		
201	10.12.2012	15,39	8322,68	-0,0091	0,0010		
202	11.12.2012	15,55	8366,47	0,0103	0,0052		
203	12.12.2012	15,44	8380,88	-0,0071	0,0017		
204	13.12.2012	15,34	8338,32	-0,0065	-0,0051		
205	14.12.2012	15,25	8333,73	-0,0059	-0,0006		
206	17.12.2012	15,12	8407,01	-0,0086	0,0088		
207	18.12.2012	15,00	8499,35	-0,0080	0,0109		
208	19.12.2012	15,18	8463,82	0,0119	-0,0042		
209	20.12.2012	15,15	8516,43	-0,0020	0,0062		
210	21.12.2012	15,00	8443,16	-0,0100	-0,0086		
211	24.12.2012	15,09	8420,55	0,0060	-0,0027		
212	25.12.2012	15,09	8420,55	0,0000	0,0000		
213	26.12.2012	15,01	8395,49	-0,0053	-0,0030		
214	27.12.2012	15,04	8399,83	0,0020	0,0005		
215	28.12.2012	14,87	8316,17	-0,0114	-0,0100		
216	31.12.2012	14,87	8443,51	0,0000	0,0152		
217	01.01.2013	14,87	8443,51	0,0000	0,0000		
218	02.01.2013	15,17	8632,01	0,0200	0,0221		
219	03.01.2013	15,32	8607,79	0,0098	-0,0028		
220	04.01.2013	15,37	8667,68	0,0033	0,0069		
221	07.01.2013	15,34	8636,91	-0,0020	-0,0036		
222	08.01.2013	15,36	8604,38	0,0013	-0,0038		

223	09.01.2013	15,64	8636,10	0,0181	0,0037		
224	10.01.2013	15,79	8713,76	0,0095	0,0090		
225	11.01.2013	15,98	8712,40	0,0120	-0,0002		
226	14.01.2013	15,74	8717,45	-0,0151	0,0006		
227	15.01.2013	16,13	8733,10	0,0245	0,0018		
228	16.01.2013	16,05	8710,56	-0,0050	-0,0026		
229	17.01.2013	15,98	8766,55	-0,0044	0,0064		
230	18.01.2013	16,00	8792,63	0,0013	0,0030		
231	21.01.2013	16,00	8792,63	0,0000	0,0000		
232	22.01.2013	16,05	8832,75	0,0031	0,0046		
233	23.01.2013	16,05	8828,66	0,0000	-0,0005		
234	24.01.2013	16,09	8856,59	0,0025	0,0032		
235	25.01.2013	16,17	8904,52	0,0050	0,0054		
236	28.01.2013	16,00	8880,02	-0,0106	-0,0028		
237	29.01.2013	16,00	8935,64	0,0000	0,0062		
238	30.01.2013	15,94	8904,32	-0,0038	-0,0035		
239	31.01.2013	15,95	8883,79	0,0006	-0,0023		
240	01.02.2013	16,00	8965,12	0,0031	0,0091		
241	04.02.2013	15,89	8852,82	-0,0069	-0,0126		
242	05.02.2013	16,05	8920,13	0,0100	0,0076		
243	06.02.2013	16,04	8934,24	-0,0006	0,0016		
244	07.02.2013	16,00	8893,75	-0,0025	-0,0045		
245	08.02.2013	16,01	8935,24	0,0006	0,0047		
246	11.02.2013	16,00	8919,02	-0,0006	-0,0018		
247	12.02.2013	15,99	8957,61	-0,0006	0,0043		
248	13.02.2013	16,00	8955,60	0,0006	-0,0002		
249	14.02.2013	16,09	8953,07	0,0056	-0,0003		
250	15.02.2013	16,10	8933,22	0,0006	-0,0022		
251	18.02.2013	16,10	8933,22	0,0000	0,0000		
252	19.02.2013	16,12	9004,38	0,0012	0,0079		
253	20.02.2013	16,11	8883,62	-0,0006	-0,0135		
254	21.02.2013	16,00	8810,29	-0,0069	-0,0083		
255	22.02.2013	16,01	8894,63	0,0006	0,0095		
256	25.02.2013	16,04	8719,40	0,0019	-0,0199		
257	26.02.2013	16,02	8766,17	-0,0012	0,0054		
258	27.02.2013	15,99	8875,33	-0,0019	0,0124		
259	28.02.2013	16,00	8868,72	0,0006	-0,0007		

Event 5 : Google & North Korea

event_id	Date	GOOGLE	NASDAQ	Ri	Rm	Rexp	AR	CAR	CAAR
1	13.07.2012	288,54	2908,47						
2	16.07.2012	287,74	2896,95	-0,0028	-0,0040				
3	17.07.2012	288,64	2910,04	0,0031	0,0045				
4	18.07.2012	290,66	2942,61	0,0070	0,0111				
5	19.07.2012	296,82	2965,90	0,0210	0,0079				
6	20.07.2012	305,71	2925,30	0,0295	-0,0138				
7	23.07.2012	308,05	2890,16	0,0076	-0,0121				
8	24.07.2012	304,08	2863,00	-0,0130	-0,0094				
9	25.07.2012	304,29	2854,25	0,0007	-0,0031				
10	26.07.2012	306,98	2893,25	0,0088	0,0136				
11	27.07.2012	317,79	2958,09	0,0346	0,0222				
12	30.07.2012	316,46	2945,84	-0,0042	-0,0042				
13	31.07.2012	316,79	2939,52	0,0010	-0,0021				
14	01.08.2012	316,65	2920,21	-0,0004	-0,0066				
15	02.08.2012	314,68	2909,77	-0,0062	-0,0036				
16	03.08.2012	320,98	2967,90	0,0198	0,0198				
17	06.08.2012	321,72	2989,91	0,0023	0,0074				
18	07.08.2012	320,58	3015,86	-0,0036	0,0086				
19	08.08.2012	321,43	3011,25	0,0026	-0,0015				
20	09.08.2012	321,49	3018,64	0,0002	0,0025				
21	10.08.2012	321,31	3020,86	-0,0006	0,0007				
22	13.08.2012	330,33	3022,52	0,0277	0,0005				
23	14.08.2012	334,65	3016,98	0,0130	-0,0018				
24	15.08.2012	334,09	3030,93	-0,0017	0,0046				
25	16.08.2012	336,76	3062,39	0,0080	0,0103				
26	17.08.2012	338,90	3076,59	0,0063	0,0046				
27	20.08.2012	338,10	3076,21	-0,0024	-0,0001				
28	21.08.2012	335,08	3067,26	-0,0090	-0,0029				
29	22.08.2012	338,92	3073,67	0,0114	0,0021				
30	23.08.2012	338,73	3053,40	-0,0006	-0,0066				
31	24.08.2012	339,64	3069,79	0,0027	0,0054				
32	27.08.2012	334,93	3073,19	-0,0140	0,0011				
33	28.08.2012	338,95	3077,14	0,0119	0,0013				
34	29.08.2012	344,34	3081,19	0,0158	0,0013				
35	30.08.2012	341,17	3048,71	-0,0092	-0,0106				
36	31.08.2012	342,88	3066,96	0,0050	0,0060				
37	03.09.2012	342,88	3066,96	0,0000	0,0000				
38	04.09.2012	340,85	3075,06	-0,0059	0,0026				
39	05.09.2012	340,69	3069,27	-0,0005	-0,0019				
40	06.09.2012	350,04	3135,81	0,0271	0,0214				
41	07.09.2012	353,42	3136,42	0,0096	0,0002				

42	10.09.2012	350,72	3104,02	-0,0077	-0,0104				
43	11.09.2012	346,43	3104,53	-0,0123	0,0002				
44	12.09.2012	345,77	3114,31	-0,0019	0,0031				
45	13.09.2012	353,36	3155,83	0,0217	0,0132				
46	14.09.2012	355,18	3183,95	0,0051	0,0089				
47	17.09.2012	355,33	3178,67	0,0004	-0,0017				
48	18.09.2012	359,49	3177,80	0,0116	-0,0003				
49	19.09.2012	364,10	3182,62	0,0127	0,0015				
50	20.09.2012	364,41	3175,96	0,0009	-0,0021				
51	21.09.2012	367,35	3179,96	0,0080	0,0013				
52	24.09.2012	375,05	3160,78	0,0207	-0,0061				
53	25.09.2012	374,94	3117,73	-0,0003	-0,0137				
54	26.09.2012	377,10	3093,70	0,0057	-0,0077				
55	27.09.2012	378,62	3136,60	0,0040	0,0138				
56	28.09.2012	377,62	3116,23	-0,0026	-0,0065				
57	01.10.2012	381,26	3113,53	0,0096	-0,0009				
58	02.10.2012	378,86	3120,04	-0,0063	0,0021				
59	03.10.2012	381,62	3135,23	0,0073	0,0049				
60	04.10.2012	384,40	3149,46	0,0073	0,0045				
61	05.10.2012	384,20	3136,19	-0,0005	-0,0042				
62	08.10.2012	379,29	3112,35	-0,0129	-0,0076				
63	09.10.2012	372,41	3065,02	-0,0183	-0,0153				
64	10.10.2012	372,64	3051,78	0,0006	-0,0043				
65	11.10.2012	376,10	3049,41	0,0092	-0,0008				
66	12.10.2012	372,74	3044,11	-0,0090	-0,0017				
67	15.10.2012	370,85	3064,18	-0,0051	0,0066				
68	16.10.2012	372,71	3101,17	0,0050	0,0120				
69	17.10.2012	378,11	3104,12	0,0144	0,0010				
70	18.10.2012	347,84	3072,87	-0,0834	-0,0101				
71	19.10.2012	341,23	3005,62	-0,0192	-0,0221				
72	22.10.2012	339,66	3016,96	-0,0046	0,0038				
73	23.10.2012	340,50	2990,46	0,0025	-0,0088				
74	24.10.2012	338,98	2981,70	-0,0045	-0,0029				
75	25.10.2012	339,21	2986,12	0,0007	0,0015				
76	26.10.2012	337,90	2987,95	-0,0039	0,0006				
77	29.10.2012	337,90	2987,95	0,0000	0,0000				
78	30.10.2012	337,90	2987,95	0,0000	0,0000				
79	31.10.2012	340,48	2977,23	0,0076	-0,0036				
80	01.11.2012	344,13	3020,06	0,0107	0,0143				
81	02.11.2012	344,29	2982,13	0,0005	-0,0126				
82	05.11.2012	341,81	2999,66	-0,0072	0,0059				
83	06.11.2012	341,19	3011,93	-0,0018	0,0041				
84	07.11.2012	333,88	2937,29	-0,0217	-0,0251				
85	08.11.2012	326,46	2895,58	-0,0225	-0,0143				
86	09.11.2012	331,84	2904,87	0,0163	0,0032				

87	12.11.2012	333,27	2904,26	0,0043	-0,0002	0,0018	0,0025		
88	13.11.2012	329,85	2883,89	-0,0103	-0,0070	-0,0038	-0,0066	-0,0041	-0,0014
89	14.11.2012	326,59	2846,81	-0,0099	-0,0129	-0,0086	-0,0013	-0,0079	-0,0020
90	15.11.2012	323,94	2836,94	-0,0081	-0,0035	-0,0008	-0,0073	-0,0086	-0,0017
91	16.11.2012	323,90	2853,13	-0,0001	0,0057	0,0067	-0,0068	-0,0141	-0,0023
92	19.11.2012	334,43	2916,07	0,0320	0,0218	0,0199	0,0121	0,0053	0,0008
93	20.11.2012	335,31	2916,68	0,0026	0,0002	0,0022	0,0005	0,0126	0,0016
94	21.11.2012	333,26	2926,55	-0,0061	0,0034	0,0048	-0,0109	-0,0104	-0,0012
95	22.11.2012	333,26	2926,55	0,0000	0,0000	0,0020	-0,0020	-0,0129	-0,0013
96	23.11.2012	334,31	2966,85	0,0031	0,0137	0,0132	-0,0101	-0,0121	-0,0011
97	26.11.2012	330,90	2976,78	-0,0103	0,0033	0,0047	-0,0150	-0,0250	-0,0021
98	27.11.2012	335,68	2967,79	0,0143	-0,0030	-0,0005	0,0148	-0,0002	0,0000
99	28.11.2012	342,17	2991,78	0,0191	0,0081	0,0086	0,0106	0,0254	0,0018
100	29.11.2012	346,28	3012,03	0,0119	0,0067	0,0075	0,0044	0,0150	0,0010
101	30.11.2012	349,52	3010,24	0,0093	-0,0006	0,0015	0,0078	0,0122	0,0008
102	03.12.2012	347,96	3002,20	-0,0045	-0,0027	-0,0002	-0,0043	0,0035	0,0002
103	04.12.2012	345,85	2996,69	-0,0061	-0,0018	0,0005	-0,0066	-0,0109	-0,0006
104	05.12.2012	344,24	2973,70	-0,0047	-0,0077	-0,0043	-0,0004	-0,0069	-0,0004
105	06.12.2012	345,90	2989,27	0,0048	0,0052	0,0063	-0,0015	-0,0018	-0,0001
106	07.12.2012	342,44	2978,04	-0,0101	-0,0038	-0,0011	-0,0090	-0,0104	-0,0005
107	10.12.2012	343,04	2986,96	0,0018	0,0030	0,0044	-0,0027	-0,0117	-0,0005
108	11.12.2012	348,78	3022,30	0,0166	0,0118	0,0116	0,0050	0,0023	0,0001
109	12.12.2012	349,12	3013,81	0,0010	-0,0028	-0,0003	0,0013	0,0062	0,0003
110	13.12.2012	351,69	2992,16	0,0073	-0,0072	-0,0039	0,0112	0,0125	0,0005
111	14.12.2012	351,32	2971,33	-0,0011	-0,0070	-0,0037	0,0027	0,0139	0,0005
112	17.12.2012	360,74	3010,60	0,0265	0,0131	0,0128	0,0137	0,0164	0,0006
113	18.12.2012	360,88	3054,53	0,0004	0,0145	0,0139	-0,0135	0,0002	0,0000
114	19.12.2012	360,40	3044,36	-0,0013	-0,0033	-0,0007	-0,0006	-0,0141	-0,0005
115	20.12.2012	361,53	3050,39	0,0031	0,0020	0,0036	-0,0005	-0,0011	0,0000
116	21.12.2012	358,16	3021,01	-0,0094	-0,0097	-0,0059	-0,0034	-0,0039	-0,0001
117	24.12.2012	355,09	3012,60	-0,0086	-0,0028	-0,0003	-0,0083	-0,0118	-0,0004
118	25.12.2012	355,09	3012,60	0,0000	0,0000	0,0020	-0,0020	-0,0103	-0,0003
119	26.12.2012	354,78	2990,16	-0,0009	-0,0075	-0,0041	0,0033	0,0013	0,0000
120	27.12.2012	353,49	2985,91	-0,0036	-0,0014	0,0008	-0,0045	-0,0012	0,0000
121	28.12.2012	350,34	2960,31	-0,0090	-0,0086	-0,0051	-0,0039	-0,0084	-0,0002
122	31.12.2012	354,03	3019,51	0,0105	0,0198	0,0182	-0,0077	-0,0116	-0,0003
123	01.01.2013	354,03	3019,51	0,0000	0,0000	0,0020	-0,0020	-0,0097	-0,0003
124	02.01.2013	361,98	3112,26	0,0222	0,0303	0,0268	-0,0046	-0,0066	-0,0002
125	03.01.2013	362,19	3100,57	0,0006	-0,0038	-0,0011	0,0017	-0,0029	-0,0001
126	04.01.2013	369,34	3101,66	0,0195	0,0004	0,0023	0,0173	0,0189	0,0005
127	07.01.2013	367,73	3098,81	-0,0044	-0,0009	0,0012	-0,0056	0,0116	0,0003
128	08.01.2013	367,01	3091,81	-0,0020	-0,0023	0,0001	-0,0021	-0,0077	-0,0002
129	09.01.2013	369,42	3105,81	0,0065	0,0045	0,0057	0,0008	-0,0013	0,0000
130	10.01.2013	371,10	3121,76	0,0045	0,0051	0,0062	-0,0017	-0,0008	0,0000
131	11.01.2013	370,35	3125,63	-0,0020	0,0012	0,0030	-0,0050	-0,0067	-0,0001

132	14.01.2013	361,98	3117,50	-0,0229	-0,0026	-0,0001	-0,0227	-0,0278	-0,0006
133	15.01.2013	362,82	3110,78	0,0023	-0,0022	0,0002	0,0021	-0,0206	-0,0004
134	16.01.2013	357,94	3117,54	-0,0135	0,0022	0,0038	-0,0173	-0,0152	-0,0003
135	17.01.2013	356,00	3136,00	-0,0054	0,0059	0,0068	-0,0123	-0,0296	-0,0006
136	18.01.2013	352,60	3134,71	-0,0096	-0,0004	0,0017	-0,0113	-0,0235	-0,0005
137	21.01.2013	352,60	3134,71	0,0000	0,0000	0,0020	-0,0020	-0,0133	-0,0003
138	22.01.2013	351,78	3143,18	-0,0023	0,0027	0,0042	-0,0065	-0,0085	-0,0002
139	23.01.2013	371,11	3153,67	0,0535	0,0033	0,0047	0,0488	0,0422	0,0008
140	24.01.2013	377,28	3130,38	0,0165	-0,0074	-0,0041	0,0206	0,0693	0,0013
141	25.01.2013	377,20	3149,71	-0,0002	0,0062	0,0070	-0,0073	0,0133	0,0002
142	28.01.2013	375,73	3154,30	-0,0039	0,0015	0,0032	-0,0071	-0,0144	-0,0003
143	29.01.2013	377,21	3153,66	0,0039	-0,0002	0,0018	0,0021	-0,0050	-0,0001
144	30.01.2013	377,28	3142,31	0,0002	-0,0036	-0,0010	0,0011	0,0032	0,0001
145	31.01.2013	378,21	3142,13	0,0025	-0,0001	0,0020	0,0005	0,0016	0,0000
146	01.02.2013	388,18	3179,10	0,0260	0,0117	0,0116	0,0144	0,0149	0,0002
147	04.02.2013	379,88	3131,17	-0,0216	-0,0152	-0,0104	-0,0112	0,0033	0,0001
148	05.02.2013	383,24	3171,58	0,0088	0,0128	0,0125	-0,0037	-0,0149	-0,0002
149	06.02.2013	385,46	3168,48	0,0058	-0,0010	0,0012	0,0046	0,0009	0,0000
150	07.02.2013	387,35	3165,13	0,0049	-0,0011	0,0011	0,0038	0,0083	0,0001
151	08.02.2013	393,07	3193,87	0,0147	0,0090	0,0094	0,0053	0,0090	0,0001
152	11.02.2013	391,59	3192,00	-0,0038	-0,0006	0,0015	-0,0053	0,0000	0,0000
153	12.02.2013	390,73	3186,49	-0,0022	-0,0017	0,0006	-0,0028	-0,0081	-0,0001
154	13.02.2013	391,81	3196,88	0,0028	0,0033	0,0047	-0,0019	-0,0047	-0,0001
155	14.02.2013	394,29	3198,66	0,0063	0,0006	0,0025	0,0039	0,0019	0,0000
156	15.02.2013	396,83	3192,03	0,0064	-0,0021	0,0003	0,0061	0,0100	0,0001
157	18.02.2013	396,83	3192,03	0,0000	0,0000	0,0020	-0,0020	0,0041	0,0001
158	19.02.2013	403,82	3213,59	0,0175	0,0067	0,0075	0,0099	0,0079	0,0001
159	20.02.2013	396,61	3164,41	-0,0180	-0,0154	-0,0106	-0,0074	0,0026	0,0000
160	21.02.2013	398,15	3131,49	0,0039	-0,0105	-0,0066	0,0104	0,0031	0,0000
161	22.02.2013	400,24	3161,82	0,0052	0,0096	0,0099	-0,0047	0,0058	0,0001
162	25.02.2013	395,77	3116,25	-0,0112	-0,0145	-0,0099	-0,0013	-0,0060	-0,0001
163	26.02.2013	395,45	3129,65	-0,0008	0,0043	0,0055	-0,0063	-0,0077	-0,0001
164	27.02.2013	400,28	3162,26	0,0121	0,0104	0,0105	0,0017	-0,0047	-0,0001
165	28.02.2013	400,99	3160,19	0,0018	-0,0007	0,0015	0,0003	0,0020	0,0000
166	01.03.2013	403,49	3169,74	0,0062	0,0030	0,0045	0,0017	0,0021	0,0000
167	04.03.2013	411,15	3182,03	0,0188	0,0039	0,0052	0,0136	0,0154	0,0002
168	05.03.2013	419,71	3224,13	0,0206	0,0131	0,0128	0,0078	0,0215	0,0003
169	06.03.2013	416,09	3222,37	-0,0087	-0,0005	0,0016	-0,0102	-0,0024	0,0000
170	07.03.2013	416,70	3232,09	0,0015	0,0030	0,0045	-0,0030	-0,0132	-0,0002
171	08.03.2013	416,16	3244,37	-0,0013	0,0038	0,0051	-0,0064	-0,0094	-0,0001
172	11.03.2013	417,81	3252,87	0,0040	0,0026	0,0041	-0,0002	-0,0066	-0,0001
173	12.03.2013	414,21	3242,32	-0,0087	-0,0032	-0,0007	-0,0080	-0,0082	-0,0001
174	13.03.2013	413,06	3245,12	-0,0028	0,0009				
175	14.03.2013	411,17	3258,93	-0,0046	0,0042				
176	15.03.2013	407,55	3249,07	-0,0088	-0,0030				

177	18.03.2013	404,29	3237,59	-0,0080	-0,0035				
178	19.03.2013	406,05	3229,10	0,0043	-0,0026				
179	20.03.2013	407,75	3254,19	0,0042	0,0077				
180	21.03.2013	406,02	3222,60	-0,0043	-0,0098				
181	22.03.2013	405,55	3245,00	-0,0012	0,0069				
182	25.03.2013	405,21	3235,30	-0,0008	-0,0030				
183	26.03.2013	406,60	3252,48	0,0034	0,0053				
184	27.03.2013	401,72	3256,52	-0,0121	0,0012				
185	28.03.2013	397,48	3267,52	-0,0106	0,0034				
186	29.03.2013	397,48	3267,52	0,0000	0,0000				
187	01.04.2013	400,98	3239,17	0,0088	-0,0087				
188	02.04.2013	406,91	3254,86	0,0147	0,0048				
189	03.04.2013	403,49	3218,60	-0,0084	-0,0112				
190	04.04.2013	397,92	3224,98	-0,0139	0,0020				
191	05.04.2013	391,90	3203,86	-0,0152	-0,0066				
192	08.04.2013	387,80	3222,25	-0,0105	0,0057				
193	09.04.2013	389,20	3237,86	0,0036	0,0048				
194	10.04.2013	395,47	3297,25	0,0160	0,0182				
195	11.04.2013	395,58	3300,16	0,0003	0,0009				
196	12.04.2013	395,41	3294,95	-0,0004	-0,0016				
197	15.04.2013	391,34	3216,49	-0,0103	-0,0241				
198	16.04.2013	397,07	3264,63	0,0145	0,0149				
199	17.04.2013	391,66	3204,67	-0,0137	-0,0185				
200	18.04.2013	383,33	3166,36	-0,0215	-0,0120				
201	19.04.2013	400,32	3206,06	0,0434	0,0125				
202	22.04.2013	400,44	3233,55	0,0003	0,0085				
203	23.04.2013	404,34	3269,33	0,0097	0,0110				
204	24.04.2013	407,12	3269,65	0,0069	0,0001				
205	25.04.2013	404,94	3289,99	-0,0054	0,0062				
206	26.04.2013	401,10	3279,26	-0,0095	-0,0033				
207	29.04.2013	409,93	3307,02	0,0218	0,0084				
208	30.04.2013	412,68	3328,79	0,0067	0,0066				
209	01.05.2013	410,61	3299,13	-0,0050	-0,0090				
210	02.05.2013	415,21	3340,62	0,0111	0,0125				
211	03.05.2013	423,27	3378,63	0,0192	0,0113				
212	06.05.2013	431,19	3392,97	0,0185	0,0042				
213	07.05.2013	429,03	3396,63	-0,0050	0,0011				
214	08.05.2013	437,24	3413,27	0,0190	0,0049				
215	09.05.2013	436,16	3409,17	-0,0025	-0,0012				
216	10.05.2013	440,54	3436,58	0,0100	0,0080				
217	13.05.2013	439,19	3438,79	-0,0031	0,0006				
218	14.05.2013	443,98	3462,61	0,0108	0,0069				
219	15.05.2013	458,39	3471,62	0,0319	0,0026				
220	16.05.2013	452,37	3465,24	-0,0132	-0,0018				
221	17.05.2013	455,03	3498,97	0,0059	0,0097				

222	20.05.2013	454,71	3496,43	-0,0007	-0,0007				
223	21.05.2013	453,92	3502,12	-0,0017	0,0016				
224	22.05.2013	445,14	3463,30	-0,0195	-0,0111				
225	23.05.2013	441,82	3459,42	-0,0075	-0,0011				
226	24.05.2013	437,08	3459,14	-0,0108	-0,0001				
227	27.05.2013	437,08	3459,14	0,0000	0,0000				
228	28.05.2013	441,06	3488,89	0,0091	0,0086				
229	29.05.2013	434,58	3467,52	-0,0148	-0,0061				
230	30.05.2013	435,80	3491,30	0,0028	0,0068				
231	31.05.2013	436,03	3455,91	0,0005	-0,0102				
232	03.06.2013	434,24	3465,37	-0,0041	0,0027				
233	04.06.2013	429,97	3445,26	-0,0099	-0,0058				
234	05.06.2013	430,27	3401,48	0,0007	-0,0128				
235	06.06.2013	432,74	3424,05	0,0057	0,0066				
236	07.06.2013	440,29	3469,22	0,0173	0,0131				
237	10.06.2013	445,54	3473,77	0,0119	0,0013				
238	11.06.2013	440,33	3436,95	-0,0118	-0,0107				
239	12.06.2013	436,41	3400,43	-0,0089	-0,0107				
240	13.06.2013	438,93	3445,37	0,0058	0,0131				
241	14.06.2013	437,94	3423,56	-0,0023	-0,0064				
242	17.06.2013	443,55	3452,13	0,0127	0,0083				
243	18.06.2013	450,75	3482,18	0,0161	0,0087				
244	19.06.2013	450,78	3443,20	0,0001	-0,0113				
245	20.06.2013	442,80	3364,63	-0,0179	-0,0231				
246	21.06.2013	440,89	3357,25	-0,0043	-0,0022				
247	24.06.2013	435,32	3320,76	-0,0127	-0,0109				
248	25.06.2013	433,52	3347,89	-0,0041	0,0081				
249	26.06.2013	437,25	3376,22	0,0086	0,0084				
250	27.06.2013	438,96	3401,86	0,0039	0,0076				
251	28.06.2013	440,61	3403,25	0,0038	0,0004				
252	01.07.2013	444,37	3434,49	0,0085	0,0091				
253	02.07.2013	441,58	3433,40	-0,0063	-0,0003				
254	03.07.2013	443,64	3443,67	0,0047	0,0030				
255	04.07.2013	443,64	3443,67	0,0000	0,0000				
256	05.07.2013	447,18	3479,38	0,0079	0,0103				
257	08.07.2013	452,98	3484,83	0,0129	0,0016				
258	09.07.2013	453,06	3504,26	0,0002	0,0056				
259	10.07.2013	453,43	3520,76	0,0008	0,0047				
260	11.07.2013	460,57	3578,30	0,0156	0,0162				

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[i] ***Mean-adjusted return model:*** According to the model, the expected return of a security is equal to a constant, estimated by averaging the series of past returns over the pre-identified estimation window. In other words this model simply assumes that the expected return of a security is equal

to its historical mean. In this model, α is set equal to the average return over the estimation period that is the historical mean of the stock and β is set equal to zero. Thus, this model does not account for market-wide factors. This model has been used by authors such as Avner and Loewenstein (1985) and Mackliney (1997).

[ii] ***Market-adjusted return model:*** The assumption in this model is that the expected returns of a security is equal to the market return. Thus, it considers that the expected return is constant across securities but not across time; in other word α and β are set equal to zero and one respectively. The model only accounts for market wide movements, which occur at the same time that the sampling firms experience the event. Scholars like DeBont and Thaler (1985), Sloan (1987), Gunaratne and Yonesava (1997) Baranas and Ma (2002) have employed this model to estimate the excess returns in different contexts.

[iii] ***Constant return model:*** This is the simplest model for normal returns. Many studies show that it is difficult to improve on. For daily data, R_{it} is usually measured by nominal return while with monthly data, it becomes excess return (monthly return – nominal risk-free return). Let μ_i be the mean return for asset i, then the constant return model is:

$$R_{it} = \mu_i + \xi_{it,} \text{ Where } E[\xi_{it}] = 0, \text{ var } [\xi_{it}] = \sigma_{\xi}^{2}$$