Assessing corporate reputational damage due to collusion: An empirical approach

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ABSTRACT

Event studies are widely used in finance and business research. The study involves identifying an event of interest, analysing the abnormal stock return and testing the significance of the event. This research assesses the change to a company's stock value after an announcement of a *collusive* engagement. The study adopts an empirical approach by means of an event study analysis to determine the magnitude of the valuation change as well as other statistical methods to define the statistical significance of the valuation variation. The research also seeks to identify if the valuation change will always be negative, given the negativity associated with the collusive announcement.

DECLARATION

I, Vincent John Wiggins, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in Finance and Investment in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Vincent John Wiggins

Signed at ……

On the …….. day of …… 2017

DEDICATION

This achievement could not have been fulfilled without the unwavering support of my wife and soul mate, Fiona Wiggins. Her tireless love and care has provided me with the impetus to get through the tough times and the inspiration to pursue excellence.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

This chapter acts as an introductory blue print of the proposed research. The context of the study highlights the importance of corporate reputation to a firm's intangible equity and the need to assess the quantum thereof. This concept is further elaborated in the explanation of the collusive construction environment in South Africa, and the degree to which the Competition Commission went to exploit the price fixing underworld. The research problem is identified as the connection between quantifying the magnitude of collusive announcements and possible reputational damage.

The objectives of the study are to establish a link between collusive announcements and the impact on corporate brand, whilst also assessing what the effect is on the market returns given the negative publicity. Finally, the earnings will then be examined before, and after, the announcement for additional assessment.

The significance of the study will provide benefit to all major stakeholders in the industry through risk management and system restructuring. A greater understanding of the problem at hand could possibly invoke regulatory change.

This chapter formerly introduces the thesis and is organised as follows. Section 1.2 presents the background to the study. Section 1.3 discusses the research problem. Section 1.4 discusses presents the research objectives. Section 1.5 presents research questions. Section 1.6 concludes the chapter by discussing the significance of the study.

1.1 Context of the Study

Literature suggests that while corporate reputations have enjoyed far more scrutiny over recent time, the topic still tends to remain largely understudied. One of the explanations for this may be due to the fact that corporate reputations are often hardly noticed until they are threatened, at which point the issue takes on greater significance. Barnett, Jermier and Lafferty (2006) sought to consolidate the shortage of studies on corporate reputation into a precise and commonly agreed upon definition of the term, which was stated as follows:

"Observers' collective judgements of a corporation based on assessments of the financial, social and environmental impacts attributed to the corporation over time."(Barnett, Jermier, & Lafferty, 2006)

Inherent and implied in this definition, are the concepts of corporate identity, image and reputational capital. Accordingly, a particular event may trigger observers to pass judgement about a firm in relation to more visible actions or mistakes. Reputational capital therefore ebbs and flows over time in parallel with the amount of judgements the firm receives, and it is often this economic and intangible asset, which is attributed to reputation.

Organisations have in recent years recognized the importance of corporate reputation as a means of achieving business goals and competitive rivalry. The proliferation of information and media coverage over the past two decades further fuels investor's demands for increased transparency within organisations. The growing attention waged against the need for social responsibility and weeding out corruption, all leads towards organisations building and maintaining strong reputations (Argenti & Druckenmiller, 2004). It would appear that while much effort and research has been put into the development of measures and tools to capture the essence of intangible brand equity, less focus has been directed towards company brand equity or corporate equity, which are determined by corporate reputation. A rather startling fact, when one considers that in the USA, Executives consider corporate reputation to be one of the most substantial drivers of success (Schwaiger, 2004). The identification and conversion of corporate reputation (intangible) into corporate equity (tangible) is limited, but would prove to be extremely valuable to organisations wishing to exploit the competitive edge or, conversely, assess the adverse repercussions of a particular event.

Further studies have shown that investors and consumers place more emphasis on 'umbrella brands' rather than individual product offerings, despite the abundance of information availability. Investors may be uncertain about product attributes and therefore may place more emphasis on the brand image which means that there is a greater reliance on the corporate brand attributes rather than individual product offering (Anand & Shachar, 1999). Organisations should therefore embrace these concepts of brand management in order to avoid investment depletion and reputation capital damage.

In recent times, the word 'collusion' has been synonymously associated with the South African construction industry. Prominent construction firms in the Republic have quickly learned how a damaged reputation can negatively impact customer loyalty and threaten the company's economic well-being. Confidence in the industry is low and public scrutiny remains high but the quantum of the damage, attributable to reputational capital, remains to be seen. The construction sector is however not the only industry to have faced allegations of collusion. Both the pharmaceutical and food industries were also targeted by the competition commission and were made to pay.

The competition commission is a statutory body constituted by Government of South Africa empowered to investigate and control restrictive business practices, abuse of dominant positions and mergers in order to achieve equity and efficiency in the South African economy. Part of the commission's role is to police anti-competitive and collusive behaviour by corporations within the republic, including the more recent enquiry into the South African construction industry, and amongst others, the pharmaceutical industry and the food and beverage sector.

The enquiry into the construction sector resulted in the declaration of fifteen companies involvement in collusive practices in the years leading up to the 2010 soccer world cup. The admission of guilt, known as a consent agreement, from the aforesaid companies, earned them leniency from the Competition Commission thereby reducing the penalties to be paid. This fast track settlement process required all guilty parties to disclose any and all involvement in anti-competitive behaviour such as bid-rigging and cover pricing after the investigation process had been completed. As such, a combined financial settlement value of R1.46bn was subsequently imposed on the offenders with mutually agreeable payment terms agreed upon (Competition Tribunal 2013). These penalties took into account the organisations involvement in the number of projects and constituted a percentage of the company's annual turnover. A statement issued by the Minister of Economic Development revealed that the companies had been sufficiently "scared" by the intervention of the commission and that the Government did not foresee any more collusive behaviour by them (Benjamin, 2013).

Similarly in 2010, the food and beverage industry was rocked by allegations of a bread cartel operating in the Western Cape Province of South Africa. The competition tribunal launched a preliminary investigation into the matter and initiated complaints toward Tiger Brands, Premier Foods and Pioneer Foods all of whom were allegedly involved in the cartel. Premier foods applied for leniency during the course of the trial in exchange for full disclosure of detail relating to the collusion. It was later disclosed that Tiger Brands and Pioneer Foods were found guilty of fixing the selling prices and other trading conditions, contrary to competitive spirit. Premier Foods also revealed that the bread cartel had made agreements into the division of markets by dividing the territories they operated in.

Furthermore in 2008, the Competition Commission alleged that four respondents in the South African pharmaceutical industry contravened the competition act by dividing the private hospital industry (Competition Commision and Adcock Ingram, 2008). The respondents, namely, Adcock Ingram Critical Care (PTY) LTD; Dismed Criticare (PTY) LTD; Thusanhong Healthcare (PTY) LTD and Tiger Brands Limited conceded to fixing bids for the supply of products to the State tender system where medicines were supplied to hospitals and healthcare services. The

competition tribunal concluded that the conduct of the companies was designed to evade competition between the colluding firms and manipulate prices for the pharmaceutical and hospital products (Africa, 2014). It was the courts findings that the respondent's had engaged in meetings to discuss their collaborative responses to government tenders and agreed their prices prior to tender submission. Adcock Ingram Critical Care were required to pay an administrative penalty of eight percent of its earnings, year ending 2007, to a value of approximately R53 million (Competition Commision and Adcock Ingram, 2008).

However, it remains to be seen as to what indirect damages can be attributed the collusive behaviour over and above the tangible financial penalties paid over proceeding years. The quantification of intangible consequences such as reputational damage due to improper business practice is limited (Perry & De Fontnouvelle, 2005). The linkage between collusion and wealth losses are not clearly understood. The purpose of this research is to address the knowledge gap by examining the stock price reaction of the offending firms and the markets to reaction to a major announcement affecting operational losses.

1.2 Problem Statement

Preceding research studies appear to have focused more on the direct costs associated with allegations of price fixing, than on any other forms of damage (Cummins, Lewis and Wei, 2004; Perry & De Fontnouvelle, 2005) . Direct costs usually encompass fines, legal actions, restitution of damage and so forth. Whilst a number of research papers have studied the shareholder wealth effects of criminal allegations against corporations and found significant market-imposed costs on shareholders as a result (Baucus & Baucus, 1997; Davidson & Worrel, 1988). However, it would appear that the linkage between allegations of corporate crime and wealth losses is still not clearly understood. To this end, the impact of collusive announcements on a firm's reputation must be investigated to reduce the knowledge gap. The connection is examined through the stock price reaction of firms to allegations of collusive activities using an event study methodology.

1.3 Research Objectives

The objectives of this study are stated as follows:

- To investigate the impact of a collusive announcement on the brand and reputation of the company by means of a literature review.

- To determine if there is a statistically significant change in the stock valuation after a Stock Exchange News Service (SENS) announcement of collusion.
- Assuming there is a valuation change, to then assess if this variation has a positive or negative impact on the firm's stock price.

1.4 Hypothesis of the study

In order to meet the objectives as stated under section 1.3, the study hypothesizes the following:

i. A firm's market value will be significantly affected whenever collusive announcements are published.

ii. The valuation change to the stock price will always be negative.

1.5 Significance of the Study

Corporate reputation is a 'soft concept'. It refers to the collective judgement of observers', including shareholders, both internal and external, in accordance with their observations and experiences in dealing with the corporation over time. Many organisations tend to focus their energy on resolving 'day to day' activities which are predominately easier to manage due to their familiarity with these activities. The technical analysis of this form of risk management forms the cornerstone of corporate governance and also takes the first step toward a better understanding of corporate worth stimulated via intangible concepts.

Over time, most organisations have developed risk assessment and management guidelines for addressing a wide range of areas, yet most appeared to have ignored the concept of reputational risk. The definition and measurement of intangible assets like brand equity and intellectual capital are hard to assess yet much market value can be derived from them. Organizations are especially vulnerable to anything that damages their reputations. This reputational damage can easily drive loyal customers to alternate products or services. Reputational damage also negatively effects future growth of the organisation, price-earnings multiples, market values and cost of capital (Eccles, Newquist, & Schatz, 2007).

The aim of this research is to investigate factors which contribute to firms participating in anti-competitive behaviour and connect the repercussions of this behaviour to a tangible change in stock value. Identifying and isolating the magnitude between operational losses and reputational damage remains largely unchartered (Perry & De Fontnouvelle, 2005). This research seeks to

narrow that knowledge gap by associating an abnormal change in firm's stock return to a corresponding announcement.

Corporate stakeholders such as regulatory authorities, contractors, consultants and shareholders stand to benefit from the research through the proactive management of reputational risk. Proper quantification and assessment of an event provides perspective to all stakeholders involved, which in turn allows process re-evaluation of risk management and the mitigation of potential threats.

Ethical issues aside, from a shareholders point of view, illegal acts may be worthwhile if their expected benefits outweigh their expected costs (Davidson & Worrel, 1988). This research seeks to investigate the legitimacy of the statement.

1.6 Organization of the Research Report

Chapter 1 provides an overview of the study in the context of the knowledge gap in the research and the objectives of the study to gain further insight. Chapter 2 explores the available literature and key themes of relevance in the field of the chosen research. The review explores similar events and previous research which underlines the core identity of the study. Chapter 3 describes the intended tools and techniques to be used toward achieving the research objectives. Chapter 4 presents the results of the statistical analysis to each event. Chapter 5 discusses the results and offers possible insight into some of the outcomes. Chapter 6 discusses the recommendations and conclusions of the study as well as offering insight into additional research in the field.

CHAPTER 2: LITERATURE REVIEW

This chapter contains a literature review on the key themes of relevance to the study. The focus of this review is to identify the elements of collusion and the macroeconomic reasoning causing firms to engage in anti-competitive behaviour. The objective of the review will be to establish a link between collusion and reputational damage to the organisation. The chapter is organised as follows: section 2.1 presents an introductory explanation of the overall chapter. Section 2.2 comprises corporate brand and reputational review of literature applicable to the study whilst section 2.3 explores the economics behind anti-trust behaviour. Section 2.4 covers factors associated with reputational risk which leads into the review of the efficient market hypothesis in section 2.5. The review ends off by investigating the investor's reaction in section 2.6, followed by a chapter summary in section 2.7.

Although collusion is a widespread phenomenon, there is surprisingly very little literature that is directly applicable to collusion in the construction sector. For this reason, similarities will have to be drawn from international case studies across similar events. The corporate reputational literature reviewed suggests that a firms' reputational impact should be assessed using an event study as the primary methodology (Gillet et al., 2010; Perry & De Fontnouvelle, 2005; Sinanaj & Muntermann, 2013). The authors find evidence that when a firm has suffered an operational loss, the impact of the stock market value exceeds that of the loss itself thus implying that the difference is attributable to reputational damage. This paper aims to explore this aspect of research, including the premise that potential reputational damage would have been caused by collusive and anti-competitive announcements.

2.1 Corporate Brand and Reputation

There is evidence that the disclosure of fraudulent activity or improper business practices at a company may serve to damage the firm's reputation, and drive away shareholders and customers. In a study of 292 US companies, Fombrun and Stanley (1990), found empirical evidence that companies reputations are constructed by observer's based on information about a firms' relative structural position by "specifically using market and accounting signals indicating performance, institutional signals indicating conformity to social norms, and strategy signals indicating strategic postures" (Fombrun & Shanley, 1990).

While the concept of reputational risk has been studied and written about at length in both academic and financial literature, direct evidence of reputational losses at financial organisation's has received far less attention (Cummins, Lewis and Wei, 2004). In a study, (Perry & De

Fontnouvelle, 2005), assessed the impact of operational loss announcements on the market value of financial institutions by examining a firm's stock price reaction to the announcement of a major operational loss event and found that losses derived from internal fraud events were interpreted as reputational damage, if the magnitude of the stock value exceeded the loss percentage. Thus, a decline in the firm's market value which exceeds the announcement loss amount was interpreted as reputational loss (Perry & De Fontnouvelle, 2005).

(Gillet, Hübner, & Plunus, 2010) build upon this method of reputational quantification using event studies to estimate the magnitude of an operational loss in the banking institutions. A research paper by (Sinanaj & Muntermann, 2013) also apply similar methodologies to assess the extent of reputational damages caused by data breaches in the information technology sector and found that newly published data breaches have a negative effect on the firms value.

2.2 Anti-Trust Law and Economics

Economics is the science of choice (Myers, 2013). In the world of economics, this implies that people should make careful choices about what is made, how it is made, for whom it will be made. In terms of construction these choices relate to the types of investments made, what and how it is constructed and on whose behalf? Myers (2013) postulates that at any given stage there are an infinite amount of wants yet the world's resources can only accommodate a finite set of needs. Construction economics, as well as its mainstream equivalent, is concerned with the allocation of these scarce resources (Myers, 2013).

The reasons warranting construction's own specialised set of economics are generally attributed to the sheer size of the industry and the profound contribution to the country's GDP. Myers describes the distinct qualities of the industry as follows (Myers, 2013):

- The demand for activity in construction is determined by the general health of the economy as a whole.
- The method of price determination is unusually complex due to the tendering process used at various stages.
- Most projects are unique and can be considered as 'once-off'.
- The physical nature of the project is very large, heavy and expensive.
- Firms in the construction industry are price takers and not price makers.

These sentiments are further correlated in research conducted by (Eckbo, 1983) where he tests the hypothesis that horizontal mergers generate positive abnormal returns to stockholders of

bidder firms and will subsequently increase the profitability of rival colluding firms. Assuming the collusion hypothesis hold true, the rivals of the merging firms benefit from the merger through the reduction of competition, lowering of production cost and ultimately increasing the price of the goods provided. Further evidence suggests that colluding firms stand to gain additional benefit if the merging firms are investigated for allegations of anti-trust laws.

It is postulated by (Eckbo, 1983) that the traditional collusion argument presumes that the incentive to co-ordinate production with rival firms is a function of the costs of monitoring the collusive agreement. These costs can be decreased by reducing the number of players in the market therefore reducing the amount of observation needed. There is therefore a higher probability of detecting of detecting cheating members in the cartel. If this scenario holds true, the cartel stands to make consistent short run gains in profit.

2.2.1 Game Theory

These aforementioned qualities are further engrained by Brockman (2009) example of collusive behaviour where he provides analysis using Taylor's game theory, under the assumption of a duopolistic condition where:

"Two companies called Bageldum and Bageldee produce rather homogenous products, bagels. They have a choice of charging the competitive price where they will earn no economic profit as marginal cost equals price or they could collude, charge the monopoly price and make a profit of $2 million each. There is also an incentive to defect from the collusion by undercutting the monopoly price just slightly (thus becoming competitive with a price above marginal cost) and by selling a large volume of bagels with a comfortable profit ($4 million in the example). The other company then will make a loss equal to fixed cost (-$1 million).(Brockmann, 2009)"

Brockman goes on to hypothesize two possible scenarios. The first scenario postulates that the incentive to defect is large, leading Bageldum to choose this option. Bageldee therefore has no other option but to reduce his price, as he will not continue to receive any business. Thus, the game is repeated over and over leading both firms to arrive at a competitive price in the long run equilibrium.

The second scenario follows on from the first by stating that Bageldum and Bageldee will sooner or later realise the unsustainable effects of competitive pricing and therefore collude again to charge the monopoly price. If the game is repeated often enough, there will not be any need for the players to engage in explicit collusion. Brockman (2009) concludes that by virtue of both

companies understanding the mechanics of collusion, there will be a convergence to the monopoly price via tacit collusion, which is not illegal. The results of monopoly pricing are that quantities are supplied below equilibrium and prices are charged above equilibrium (Varian & Repcheck, 2010).

2.2.2 Market Structure

“Collusive tendering is a prohibited practice in which rivals inflate prices in markets where the customer acquires goods or services through soliciting tenders”,(Khumalo, Nqojela, & Njisane, 2013). Organisations, both public and private, rely on a competitive bidding process to achieve this end. However, the competitive process only works, when prices are set independently and honestly by the various competitors. When competitors collude, prices are inflated and ultimately the customer is cheated. Price fixing, bid rigging, and other forms of collusion are illegal and are subject to criminal prosecution by the Competition Commission in South Africa.

Brockman (2009) categorizes construction into three different levels of market structure:

- Macro-level or national construction market: In all capitalist countries the number of construction companies competing for jobs is very large. Construction investment is high and the average job size is small relative to the overall investment. The market is in perfect competition.
- Mezzo-level or regional construction market: Usually, depending on the business cycle, both supply and demand are characterized by a large number of players. The market is in perfect competition, except for a few abnormalities.
- Micro-level or construction project market: The structure depends on the choice of the client (demand side).

Competitive markets on the macro- and mezzo-level prevent each single construction company of having an influence on quantity or price; they act as quantity and price takers. Therefore, an argument can be made that there are strong incentives for contractors to collude, as long run economic survival is at stake. The question remains as to how this can be avoided.

2.3 Reputational Risk

It may be postulated that companies of sound standing and a positive reputation are more likely to attract higher calibre staff. Most often because they are perceived to provide higher value services and goods, which in turn enables them to charge a premium. The market in turn,

perceives that such companies will deliver sustained earnings, and as a result, they have higher price-earnings multiples, market values and lower costs of capital (Eccles et al., 2007).

Reputational risk is defined by (Sturm, 2013), as “the risk arising from a negative perception on the part of customers, shareholders, counterparties, investors, debt holders, market analysts, regulators and other relevant parties that can adversely affect the firm’s ability to maintain existing, or establish new, business relationships and continued access to sources of funding” (Sturm, 2013).

Reputational risk is however classified as an intangible asset and is becoming increasingly difficult to manage, notwithstanding its importance and the risks associated with inadequate management.

2.3.1 The Rise of Intangible Assets

Business risk auditing (BRA) has become the accounting audit risk benchmark since the concept was developed in the 1980’s (Power, 2004). The development and analysis of the practice essentially advanced two notable divisions in the model, namely primary and secondary risk spheres. The primary risk is the misstatement of financial statements and the secondary risk component reflect the risk of financial and reputational losses to the business itself.

According to Power (2004) reputational risk, which is traditionally thought of in terms of financial magnitude, means that even apparently small events or losses, such as a minor regulatory fine, can have much larger repercussions. Much depends on the surrounding media, legal systems and social processes as to the degree of amplification to the reputational damage. These sentiments are echoed by (Rayner, 2004), where popular primary risk shareholder value benchmarks such as EBITDA (earnings before interest taxes amortisation and depreciation) have become discredited due to accounting manipulation. Rayner (2004) suggests that a blinkered focus on financial parameters can be a recipe for disaster, hence the renewed emphasis on secondary risk and intangible assets.

2.3.2 Drivers and Measurement

There are many factors that have been found to drive reputational risk and this include work place talent and culture, corporate social responsibility, financial performance and long-term investment value, corporate governance and leadership, regulatory compliance, communication

and crisis management (Rayner, 2004) etc. Smutniak (2004) found that the single biggest risk or business hazard was reputational risk (Smutniak, 2004).

Organisations must develop a framework to measure reputational risk, given the trend toward favouring the secondary drivers.

Emphasis is made to the management of reputation as not necessarily keeping ones head below the parapet, but also exploiting these factors to produce positive light on the company. The final conclusion of the review is that reputational risk is defined as any action, event or circumstance that could adversely or beneficially affect an organisations reputation.

Corporate governance is identified as one of the drivers affecting an organisations reputation. This specifically refers to compliance with laws and regulations, the personal integrity of directors and the transparency of reporting and communications. Rayner's summation of key drivers are supported by research conducted by (Gaultier-Gaillard & Louisot, 2006) where a relatively small survey was conducted amongst 20 organisations to ascertain their feedback of key drivers affecting reputational risk. Their findings concluded that 83 percent of the respondents acknowledged reputation to be a key component in reaching the organisations strategic objectives. About 16 percent had a formalized quantification process to monitor and measure a company's reputation, whereas 58 percent chose to use informal information and publications to measure it.

2.4 Market Efficiency

Event methodology is an appropriate way to determine the valuation effects caused by socially irresponsible and responsible actions because it can find very short term, even single day, reactions to a particular event (Davidson & Worrel, 1988). Accounting based returns may not reflect these reactions until the reports have been prepared and formally issued to the public. By this stage, the impact of the event itself may not be discernible due to several other events having recorded over a longer period.

Efficient Market Hypothesis (EMH) (Malkiel & Fama, 1970) has dominated the analysis of financial economics for the last four decades. This method has become the gold standard for gauging security price reaction to an announcement or an event (Binder, 1998). In practice, event studies have been used for two main reasons:

A. To test the null hypothesis that the market efficiently incorporates all information.

B. Under the maintained hypothesis of market efficiency (with respect to information that is publically available), to examine the impact of some event on the shareholders and the firms wealth.

EMH states that market prices fully reflect all available information. This hypothesis is rooted in the traditional neoclassical economic approach that states that the theory:

> "*has been challenged by economists who stress psychological and behavioural elements of stock-price determination and by econometricians who argue that stock returns are, to a considerable extent, predictable"* (Malkiel, 2003).

Davidson and Worrel, 1988, prescribe that the market model has proven to a worthy predictor of normal returns, for studies into irresponsible behaviour and corporate performance (Davidson & Worrel, 1988). To this end, the market model is formed by regressing the daily returns of each security against a market index. The normal returns are computed for each firm for a period before and after the event announcement. The difference between the normal and the actual return is then computed as the abnormal return. If investors have received information that causes stock prices to rise relative to the market, the average abnormal return and the cumulative abnormal return will be positive. The opposite also holds true. Statistical t-tests are computed to determine the levels of significance.

2.4.1 Market Over-Reaction

J.M. Keynes was one of the first to note market overreaction in day to day fluctuations of profits (Keynes, 1937). As did J.B Williams in 1938 where he noted that "*prices were based too much on the current earning power and too little on the long-term dividend paying power* " (Williams, 1938, pp. 28, p.19). The term 'overreaction' carries with it an implied comparison of 'reaction' which is considered to be appropriate. A study of market efficiency by (Bondt & Thaler, 1985) investigated weather behaviour affects stock prices. Enthusiasts in the field market behaviour and individual decision making, conducted research and found that the market tends to 'overreact' to unexpected and dramatic news events, but will correct themselves in the opposite direction over time. The results of the study discovered substantial weak form inefficiencies which were consistent with overreaction hypothesis. When observed behaviour diverges from the predicted model, two hypotheses are suggested; either the model has been incorrectly specified or the market is inefficient.

In contrast to the idea of efficient models (Kahneman & Tversky, 1977) conducted research into the field of intuitive prediction and discovered that people are prone to give insufficient weight to certain types of information such as base-rate (current) frequency of outcomes and their predictability. This is consistent with Williams's statement regarding the current earning power and long-term dividend potential, which suggests that investors overweight dramatic news events which in turn drive the price of the affected stock too far. This overreaction can create arbitrage opportunities since investors can create portfolios with abnormal risk adjusted returns.

The overreaction hypothesis was tested by the Johannesburg Stock Exchange (JSE) in a study conducted by (Page & Way, 1992) where their findings produced clear evidence of investor over-reaction. On average, the returns of a listed portfolio 'losers' significantly outperformed the 'winners' over a thirty-six month period by between 10% and 20% for both two year and three year formation periods. All of which was significant at a 1% level.

2.5 Investigation of Investor Reaction

In a study undertaken by (Perry & De Fontnouvelle, 2005), an analysis was performed and the reputational impact assessed of a company's stock price reaction in relation to an announcement of a major loss event. Loss percentages were computed as dollar losses divided by the firm's market capitalization, and a market model was used to determine abnormal returns for each organization. The abnormal return for a firm was defined as the difference between the firm's actual return and the expected return based on a one-factor market model. Any decline in a firm's market value that exceeds the announced loss amount is interpreted as a reputational loss.

What (Perry & De Fontnouvelle, 2005) found, was that there was significant impact of an operational loss announcement on the firm's market value. Further findings also suggested that market values fall one-for-one with losses caused by external events, but fall by over twice the loss percentage in cases involving internal fraud.

Cummins, Lewis and Wei (2006) also assessed the market value impact of an operational loss announcement by US banks and insurance companies. They found that operational loss announcements tend to exert a negative impact on equity values, with insurance stocks suffering greater losses than the banks. Cummins et al. (2006) also established a positive relationship, which suggested that operational loss announcements tend to have a larger market impact on firms with greater growth prospects (Cummins, Lewis, & Wei, 2006).

Palmrose, Richardson and Scholz (2004) assessed the market reaction to earnings restatement announcements. They found that the average abnormal returns were approximately -9% over a 20 day window surrounding the announcement. There was also evidence to suggest that statements involving fraud tended to have a more negative effect on the market reaction. Furthermore, they postulated that investors tended to be more concerned with restatements that had a negative effect on management integrity than restatements which were attributed to technical accounting issues. Murphy, Shrieves and Tibbs (2009) examined the market impact of firms that had allegedly committed acts of misconduct. These acts included antitrust violations, fraud bribery and copyright infringements, of which acts of fraud were found to be the most detrimental to stock prices. Murphy et al. (2009) also found that the company's size was negatively related to the percentage loss in firm market value and that allegations of misconduct were accompanied by increases in the variability of stock returns. In addition to this they attributed the influence of the firm's size on market losses to both the economy of scale effect and a reputation effect. With the reputational effect, larger firms with more robust brand power were able to reduce the impact of the loss from a damaging announcement.

2.6 The Impact of Announcements on Returns

There was significant literary debate in the early 1980's surrounding the relationship between corporate social responsibility and financial performance (Arlow & Gannon, 1982; Cochran, Wood, & Jones, 1985). The lack of consensus was attributed to three main methodological inconsistencies, namely: i) the use of questionable indices of social responsibility ii) poor measure of financial performance and iii) inadequate statistical procedures (Ullmann, 1985). (Davidson & Worrel, 1988) addressed these concerns in their study by firstly replacing corporate illegalities as a proxy for corporate social responsibility. Secondly, they assessed the financial performance via shareholder returns as the preferred medium of performance. They further argued that typical accounting-determined profitability measures were inadequate when measuring cross-sectional comparisons over industries and time. And lastly, they employed an event study as the chosen medium to evaluate the impact of the event against financial returns, premised upon the assumption that if the market operates efficiently it will penalize irresponsible acts.

After incorporating these amends into the study, the results showed that the market did react negatively to the announcement of corporate illegality, but the reaction was a one-time downward adjustment of stock return on the day the news first reached the market, indicating that the timing

was not trivial. Their results showed that the market does, at least in the short term, penalize the stock price of firms that are caught in socially irresponsible acts.

Similarly, negative abnormal returns were associated to product recall announcements in the automobile industry in previous research. An extension of this research by (Davidson & Worrell, 1992) found that product recalls and products taken off the market, outside of the automobile industry, also had negative abnormal returns but were significantly more negative when products were replaced as opposed to being repaired.

2.6.1 Research Question 1

i. A firm's market value will be significantly affected whenever collusive announcements are published.

2.6.2 Research Question 2

ii. The valuation change to the stock price will always be negative.

The research instruments necessary to answer these questions is further elaborated on in Chapter 3.

CHAPTER 3: RESEARCH METHODOLOGY

Event study analysis is a statistical method used to evaluate the relevance of a particular event on firms' future prospects by examining its impact on the firms' price. The purpose of the tool is to elicit a share return response to a specific unanticipated event. The theoretical underpinning of the event study methodology is founded by efficient market hypothesis (Malkiel & Fama, 1970) which promulgates the theory that a firm's stock price reflects all available information and the expectations of the future prospects of the firm. An event study differentiates between the actual returns against the expected returns, which are the returns that would have been expected if the event had not taken place. Statistical methods, such as T-tests, are then employed to interrogate the significance of the event.

This section provides an overview of the research design and the model that was created to deliver on the proposals. Issues surrounding the data are discussed, followed by a review of the research design and research instrument to be used. The chapter is organised as follows: Section 3.1 discusses the data and data sources. Section 3.3 presents the research design and chapter summary concludes the chapter. Issues of data collection and analysis in relation to this study will be provided, followed by an overview on the validity and reliability of this study.

3.1 Data and Data Sources

Two prevailing conditions had to be observed for a company to be included in the study. Firstly, the company's stock value had to be publically listed in the Johannesburg Stock Exchange (JSE) and secondly, any notifications of collusive behaviour had to be publically reported with relevant particulars readily available. These parameters ensured that the data collection can be readily obtained from prominent websites and public domains such as Bloomberg or Yahoo finance.

Additionally, the South African Competition Tribunal was also used to correlate the accuracy of the event date as the tribunal publically lists companies that have been caught in collusive engagements as well as any penalties imposed. The study makes use of these event dates as the basis of a transgression as well as the SENS announcements from the Bloomberg archives.

Once the population had been determined, the daily share price data was then collected from the Bloomberg archives from the year 2002 to 2014. In many instances, several companies were not yet listed as early as 2002 and their data was therefore collected from the date of registration. In all instances, this did not impede the event window period or skew the estimation window in any way.

3.2 Population and Sample

3.2.1 Population

Companies that conformed to the prescribed parameters in section 3.2 were then packaged into their respective industry sectors for ease of differentiation, namely construction; food and pharmaceutical sectors. Twenty five (25) companies make up the population in total.

However, not all of the twenty five companies were directly implicated in collusive practice. Nine of the fifteen construction companies were directly implicated in collusive announcements and therefore met the selection criterion. However, the all fifteen (15) construction companies have been assessed to ascertain the impact to the industry overall. The same applies to the food and pharmaceutical sectors. Only one company has been evaluated in the petro-chemical sector due to the lack of competition and publically listed information.

The population for the study is listed as in Table 1.

INDUSTRIAL SECTORS AND COMPANY NAMES			
CONSTRUCTION	**FOOD**	**PHARMACEUTICAL**	**PETRO-CHEMICAL**
AFRIMAT LTD	ASTRAL FOODS LTD	ADCOCK INGRAM HOLDINGS LTD	SASOL
AVENG LTD	AVI LTD	ASCENDIS HEALTH LTD	
GROUP FIVE LTD	CLOVER INDUSTRIES LTD	ASPEN PHARMACARE HOLDINGS LT	
MURRAY & ROBERTS HOLDINGS	ILLOVO SUGAR LTD	CIPLA MEDPRO SOUTH AFRICA LT	
PPC LTD	OCEANA GROUP LTD		
RAUBEX GROUP LTD	PIONEER FOODS LTD		
STEFANUTTI STOCKS HOLDINGS	QUANTUM FOODS HOLDINGS		
WILSON BAYLY HOLMES-OVCON	RCL FOODS LTD/SOUTH AFRICA		
BASIL READ HOLDINGS LTD	TIGER BRANDS LTD		
ESOR LTD	TONGAAT HULETT LTD		

Table 1: Total population

For further differentiation, the construction companies that were directly implicated in collusive engagements as listed by the Competition Tribunal are highlighted in light grey.

Afrimat LTD and PPC LTD were not directly implicated in the collusion nor fined by the competition tribunal, but have been included in the regression analysis to analyse possible trend. Similarly to the construction cartel, two of the ten food and beverage companies were directly involved in the bread cartel scandal have been included in the investigation. Similarly in the pharmaceutical section, Adcock Ingram Holdings remain the sole candidate to conform to the selection criteria.

3.3 Research Design

The event study method was developed to measure the effect of an unanticipated event on stock prices. Given market rationality, the change in value will be reflected in the market security. McKinlay, 1997, suggests that there is no unique structure to conducting an event study analysis, but does however prescribe a general flow of analysis. The initial task is to define the event, which in this case is an announcement referring to a collusive engagement, after which the period over which the security prices of the firms involved in the event will be examined.

These event dates are defined in Table 10 in the addendum.

3.3.1 The Market Model

After the event dates have been selected, the model for analysis must be decided upon. There are two common choices for modelling the normal return, namely the *constant return model* and the *market model*. The most common model used for analysis, the '*market model*', is a statistical model which relates the return of any given security to the return of the market portfolio (MacKinlay, 1997) and is applied to this study due to the relevance of predicting normal returns around an event date. The benefit of using the market model will depend upon the R^2 of the market model regression. The higher the R^2 the greater is the variance reduction in the abnormal return and subsequently the larger is the gain.

This study also analyses results using the single factor return model. The single factor model regresses the firm's stock returns against a single market reference as opposed to the two factor model which regresses the firm's stock return against both the market and industry reference. This study makes use of the JSE All Share index as the market reference in the model.

3.3.2 Length of the Estimation Window

Once the appropriate model has been selected, the length of the event window must be decided. The length of the event window must also be representative of the nature of the event being studied (Ryngaert & Netter, 1990, pp 275). Long event windows drastically reduce the power of the test statistic which leads to false inferences about the significance of the event (McWilliams & Siegel, 1997). The windows should therefore be as short as possible to capture the significant effect of the event as well as eradicate any confounding events. Consideration must also be given to the likelihood of leakage of the event information prior to the announcement. 181 day event windows, which equates to approximately nine trading months, were not uncommon in the

McWilliams and Siegel study. The study also found that multiple studies were used without justification of the window periods.

Brown and Warner suggested that an ideal short term estimation window to be 120 days prior to the pre event, as generally the event period itself is not included. (Brown & Warner, 1985). A 41 day event window is usually employed, comprised of 20 pre-event days, the event day and 20 post event days (MacKinlay, 1997).

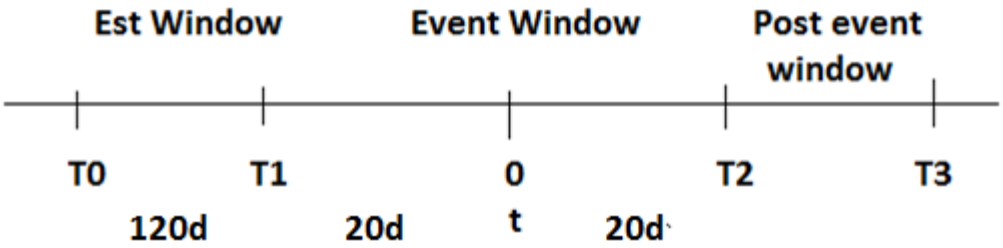


Figure 1: Estimation period and event window

For the purpose of this research an estimation window period of 120 days will be used as well as a 41 day event window.

3.3.3 Abnormal Return and Cumulative Abnormal Return

The appraisal of the event's impact requires a measure of the abnormal return on a particular day. This represents the difference between the actual stock return ($R_{i,t}$) on that day and the normal return of the firm over the event window. The normal return is defined as the expected return should the event not had taken place. The abnormal reaction of the value of the stock returns will be measured as the difference between the actual and the predicted returns. The predicted returns are based on two inputs, namely, the typical relationship between the references index and the firms stock (expressed by the slope (α) and intercept (β_i) parameters) and the actual reference market's return ($R_{m,t}$). Abnormal returns and cumulative abnormal returns are calculated as follows:

$$AR_{it} = R_{it} - (\alpha + \beta_i R_{mt}) \quad (1)$$

where $AR_{i,t}$ represents the abnormal stock return of firm $_i$ on day $_t$, and $R_{i,t}$ is the stock return of firm *i* on day *t*, $R_{m,t}$ represents the rate of return of the market index on day *t* and *α, β* represent the slope and the intercept of the ordinary least squares (OLS) estimates of the linear model that describe the sensitivity of $R_{i,t}$ to the market index of $R_{m,t}$ (calculated for an estimated window of 120 days).

A sample study is an analysis performed for multiple events of the same type and may yield typical stock market response patterns. Typical abnormal returns associated with a distinct point in time are defined as follows:

$$AAR_i = \frac{1}{N}\sum_{t=1}^{N} AR_{it} \tag{2}$$

However, the sum of the individual abnormal returns can be summed to measure the window event, which is the impact of the event over a particular period of time. This is known as the cumulative abnormal return.

$$CAR_i\ (t_1, t_2)\ = \sum_{t=t_1}^{t_2} AR_{it} \tag{3}$$

Cumulative average abnormal returns (CAAR's) are further calculated should the sample study hold multiple observations of the same event type, which represents the mean values of identical events. $CAR_{I,tl,t2}$ is the cumulative stock return of firm *i* from day t_1 *to* t_2

$$CAAR_i = \frac{1}{n}\sum_{t=1}^{n} CAR(t_1, t_2) \tag{4}$$

3.3.4 Regression

A regression describes and evaluates the relationship between a given variable and one or more other variables. A regression analysis is conducted to calculate the alpha, beta and sigma values that explain the relationship between the firm's security and its market reference. These three parameters can then be used to predict the normal returns for days in the event window. Under general conditions ordinary least squares (OLS) is a consistent estimation procedure for the market model. The abnormal return, the metric of interest, is then found in the difference between predicted return and the normal return.

3.3.5 Testing for Significance

The testing framework for abnormal returns, known as the *t-test,* is used to asses weather the cumulative average abnormal return is significantly different from zero (it's expected value) is computed as the standard deviation:

$$\sigma(CAAR_i(T_1,T_2)) = \sqrt{\frac{1}{N(N-d)}\sum_{t=1}^{n}(CAR_i(T_1,T_2) - CAAR_i(T_1,T_2))^2} \quad (5)$$

The null hypothesis plays an important role when testing the statistical significance of an outcome as well as the techniques for aggregating the individual normal returns of a firm. There are always two hypotheses that go together in the hypothesis testing framework, denoted as H_0 for the *null hypothesis* and H_1 as the *alternative hypothesis*. The null hypothesis is the statement that is actually being tested and the alternate hypothesis represents the remaining outcomes of interest. In this study the null hypothesis follows as:

$$H_0: \beta = 0$$

$$H_1: \beta \neq 0$$

This hypothesis testing framework relies on a *test of significance* which rejects the null hypothesis should the estimated value differ significantly from zero. A *statistical decision rule* is then applied to determine the magnitude of significance. In this study, the 5% confidence rule is applied under normal distribution conditions, illustrated in Figure 2.

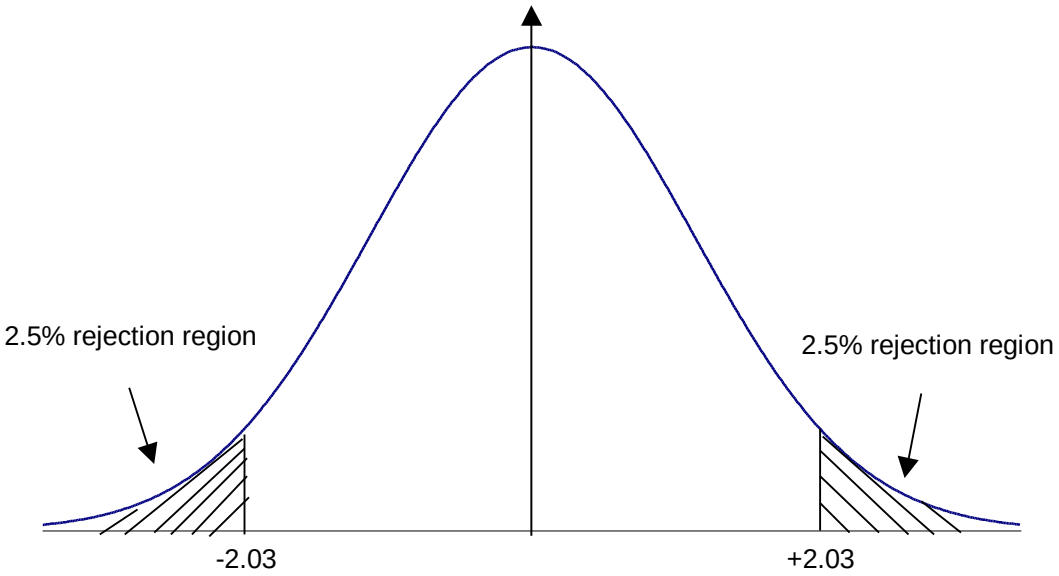


Figure 2: Confidence interval applied to the study (Brooks, 2014)

If the null hypothesis is rejected at the 5% level, it is said that the test is statistically significant. The opposite is true if the test is not rejected, it is then said to be insignificant. However, this does not mean to say that a statistically significant result will be practically significant. A slightly higher beta value exceeding 2.03, say 2.16, may be statistically significant but may not have a significant financial or practical bearing on the outcome.

The cumulative abnormal return measures the average effect of the value on *n* firms. The significance of the abnormal return implies that the event had a significant impact on the value of the firms if it is significantly greater than zero. A positive t-test will imply that there was a positive impact to the firm's security whilst a negative value will imply that the security decreased in value.

In this study, the test statistic is applied to the individual firms associated with the collusion as well as a cross-sectional test applied to the industry as a whole to test for significance. A cross sectional t-Test is also applied to test the variance across the industry competitors in the event field, and is calculated as:

$$T_{cross} = \frac{CAAR(T_1, T_2)}{\sigma(CAAR(T_1, T_2))} \quad (6)$$

3.4 Underlying Assumptions

A few conventions need to underpin the study in order to produce tangible results.

3.4.1 Market Efficiency

The first assumption implies that stock prices instantaneously incorporate all relevant information available to investors on the market, rendering the market efficient. An event is therefore anything that results in new information being transmitted to an investor.

3.4.2 Unanticipated Events

The event study relies on unanticipated announcements to the press. Anticipated announcements or leaked information will distort the results of the study as it is difficult to determine when traders became aware of the event news.

3.4.3 Confounding Effects

The third and most critical assumption presumes that the event in question is isolated from any other rival events within the same period. For example, the announcement of the company's dividend release over the same window period would distort the abnormal return. This distortion of the event also becomes more problematic the longer the window period.

3.5 Measuring and Analysing Abnormal Returns

The analysis of the market model requires some notational explanation before commencement. Returns are indexed using event time noted as $\boldsymbol{t}$**.** The event date is then defined as $\boldsymbol{t}$ = 0 which then defines the event window as $\boldsymbol{t}$ = T1 + 1 to T2 by association. The estimation can then be given as $\boldsymbol{t}$ = T0 + 1 to t = T1. Let L1 = T1 – T0 and L2 = T2 – T1 be the length of the estimation window and the event window respectively. This is illustrated in Figure 3 accordingly.

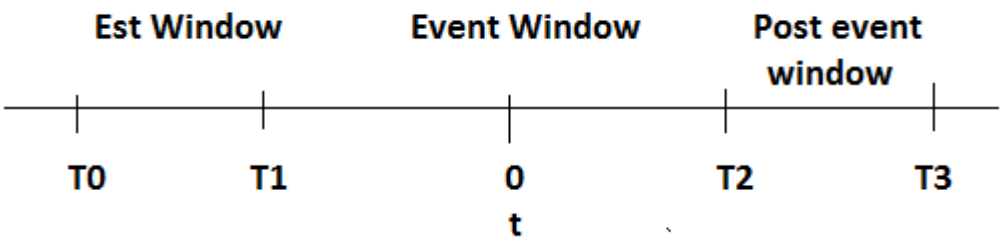


Figure 3: Timeline for an event study

Figure 3 depicts the timeline arrangement in the analysis which ensures that the estimation window and event window do not overlap. Including the event window in the estimation period could have a large influence on the normal return measure and in turn could have an impact on the event.

3.6 Limitations of the Study

An event study is an uncomplicated research method which allows elementary interpretation of results. The methodology allows the assessor to investigate both gains and losses caused by a given event and the associated perception of the market. In certain instances, market inefficiency may taint the stock prices reflection as they do not immediately incorporate the information at hand. Some events may also be expected which further induces bias into the stock returns.

Estimation periods are widely varied given the type of research which could further bias return values. This could also be exaggerated by coexisting events within the estimation window which may potentially affect the accuracy of the readings.

The choice of model as well as the choice of market reference will also have a bearing on the results in both magnitude and significance. For example the average market return model will produce upwardly and downwardly bias for the abnormal return in a bullish or bearish market, respectively.

Lastly, cross sectional dependence can occur should calendar clustering of events occur. Cross correlation of abnormal stock returns could occur if there is an overlap of event dates or sample stocks.

CHAPTER 4: PRESENTATION OF RESULTS

Chapter 4 presents the results of the analysis. The analysis was conducted in Microsoft Excel as per the research design outlined in Chapter 3. Twenty one (21) out of the twenty six (26) events listed in Table 10 in the addendum were analysed independently to obtain their abnormal returns and associated t-tests to assess significance of the results. The event findings are grouped into the varying industries namely, construction, food and beverage, petrochemical and pharmaceutical and tabled herein.

4.1 Results Pertaining to Question one

H0: A firm's market value will be significantly affected whenever collusive announcements are published.

4.2 Events Occurring within the Construction Industry

The construction sector accounted for 13 of the 25 collusive events listed in Table 2. This represents the most prominent collusive sector in South Africa with over 50% of the count. Publically listed information was available for 7 of the 13 events as listed in Table 10:

Event no.	Date	Ticker	Listed: Information available	Industry	Company
2	13-Feb-09	AEG	Yes	Construction	Aveng
6	01-Sep-09	AEG MUR WBO GRF SSK RBX BSR ESR	Yes	Construction	AVENG Murray and Roberts WBHO Group 5 Steffanutti Stocks Raubex Basil Read Esor
7	11-Nov-09	PPC	Yes No No	Construction	PPC Lafarge Afrisam
10 **12**	10-Aug-10 26-Aug-10	AEG	Yes No	Construction Steel/ Construction	Aveng Scrap metal merchants
13	25-Oct-10		No	Construction	Pipe cartel
14	01-Nov-10		No	Steel/ Construction	Scrap metal merchants
16	03-Nov-10		No	Steel/ Construction	Scrap metal merchants
21	01-Feb-11	AEG MUR	Yes Yes	Construction	Aveng Murray and Roberts
22	07-Feb-11		No No No	Steel/ Construction	SA Metal and Machinery (SAM) National Scrap Metal Ben Jacobs Metals
24	16-Mar-11	LBH	Yes No	Property Market	Liberty Group Limited Win Twice Properties
25	02-Apr-12	ACL EHS	Yes Yes No	Steel/ Construction	Acer Mittal South Africa LTD Highveld Steel Vanadium Corporation LTD
26	22-Jul-13	AEG MUR WBO GRF SSK RBX BSR ESR	Yes Yes Yes Yes Yes Yes Yes Yes	Construction	AVENG Murray and Roberts WBHO Group 5 Steffanutti Stocks Raubex Basil Read Esor

Table 2: Construction sector events

Events 2, 6, 7, 10, 21, 24, 25 and 26 have been analysed in the study and presented herein.

4.2.1 Event 2

Event 2 relates to a press statement by the competition commission finding Aveng (Africa) culpable to an R46m penalty against the subsidiary Infraset for collusive tendering in the market. The company was fined 8 % of Infraset's revenue for fixing the selling price of pipes, culverts and manholes. A consent agreement by the company revealed that the offending parties had regular meetings around the country in which they discussed and agreed to divide contracts amongst each other, divide geographic markets and allocate products to one another.

Regression 2 Output:

Event Dates	
Regression Window Begin	24-Jul-08
Regression Window End	15-Jan-09
Event Window Begin	16-Jan-09
Event	13-Feb-09
Event Window End	13-Mar-09

Regression Results	
Companies Involved	AEG
ALPHA (Intercept)	-0.0020
BETA (Slope)	0.9646
Standard Error	0.0394
R-square	0.3366

Significance 2 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	AEG
Mean	-0.0531
Standard Deviation	0.0731
Sum	-2.1775
Count	41
T-stat	-4.6526
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	0.0000
Significant (p-Value)	Yes

Cross-sectional testing is not applicable given the absence of other industry participants.

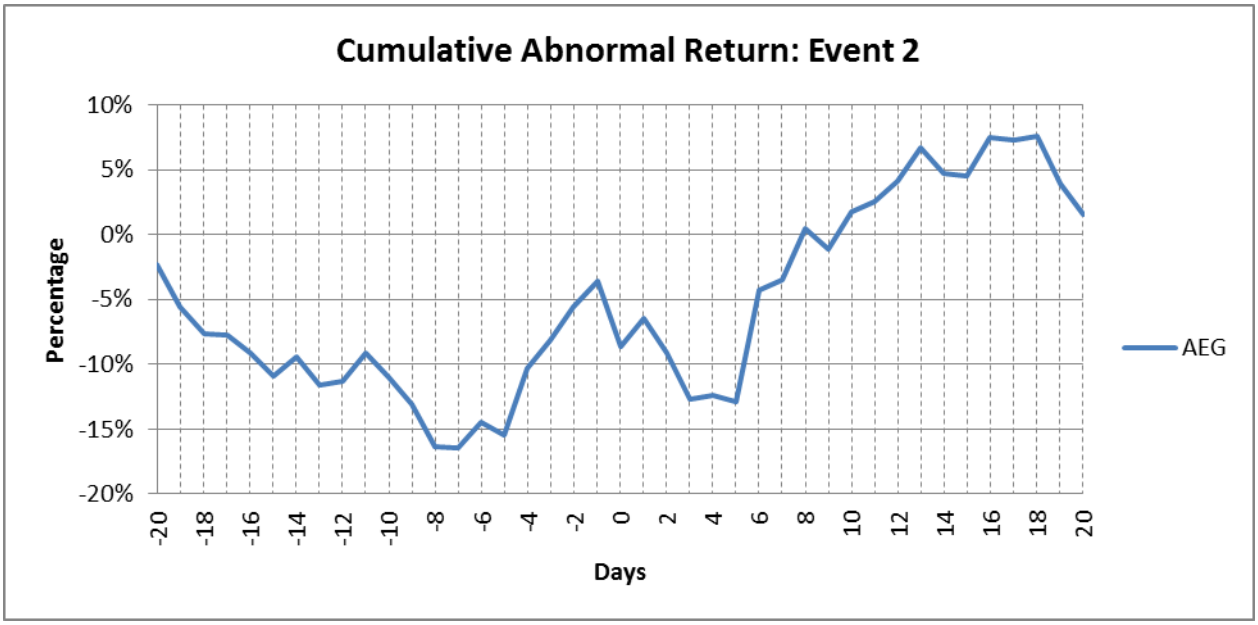


Figure 4: Event 2 CAR reaction

4.2.2 Event 6

Event no. 6 refers the release of a SENS announcement by the competition tribunal of its intention to investigate allegations of collusion in the construction sector as well as an announcement outlining penalties to steel companies for participating in collusive practice.

Regression 6 output:

Event Dates	
Regression Window Begin	05-Feb-09
Regression Window End	31-Jul-09
Event Window Begin	03-Aug-09
Event	01-Sep-09
Event Window End	30-Sep-09

Regression Results								
Companies Involved	AEG	MUR	WBO	GRF	SSK	RBX	BSR	ESR
ALPHA (Intercept)	0.0025	0.0003	0.0012	0.0010	0.0010	0.0029	-0.0013	0.0027
BETA (Slope)	0.6940	0.7480	0.3794	0.5893	0.3149	0.4148	0.2754	0.3665
Standard Error	0.0224	0.0270	0.0164	0.0232	0.0341	0.0256	0.0206	0.0315
R-square	0.2405	0.2015	0.1503	0.1747	0.0274	0.0795	0.0556	0.0426

Significance 6 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0								
Companies Involved	AEG	MUR	WBO	GRF	SSK	RBX	BSR	ESR
Mean	0.0223	0.1089	0.0049	0.0880	-0.0354	-0.0457	0.1831	-0.0300
Standard Deviation	0.0549	0.1085	0.0361	0.0612	0.0528	0.0428	0.0838	0.0404
Sum	0.9147	4.4642	0.2019	3.6089	-1.4514	-1.8756	7.5087	-1.2301
Count	41	41	41	41	41	41	41	41
T-stat	2.6022	6.4279	0.8726	9.2044	-4.2898	-6.8392	13.9861	-4.7502
T-crit	-2.0211	-2.0211	-2.0211	-2.0211	-2.0211	-2.0211	-2.0211	-2.0211
Significant (T-test)	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
p-Value	1.9871	2.0000	1.6119	2.0000	0.0001	0.0000	2.0000	0.0000
Significant (p-Value)	No	No	No	No	Yes	Yes	No	Yes

Cross-sectional 6 Testing:

Hypothesis Test: Null Hypothesis: CAAR = 0	
Cross Sectional T-test (CAAR)	
Mean	0.0982
Standard Deviation	0.1252
Sum	0.7853
Count	8
T-stat	2.2177
T-crit	-2.36462
Significant (T-test)	No
p-Value	1.937909
Significant (p-Value)	No

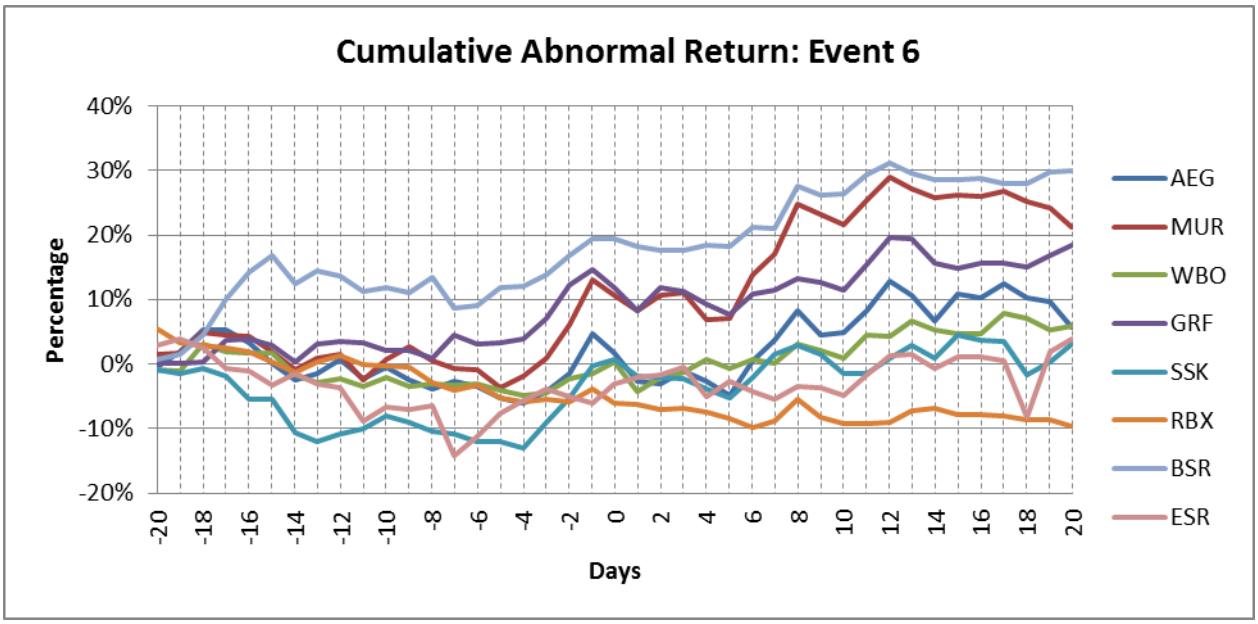


Figure 5: Event 6 CAR reaction

4.2.3 Event 7

Event 7 involves a SENS announcement by the cement and aggregate company, PPC Pty LTD, whereby they confess to their transgressions in the price fixing of cement and are subsequently afforded conditional leniency.

Regression 7 output:

Event Dates	
Regression Window Begin	20-Apr-09
Regression Window End	13-Oct-09
Event Window Begin	14-Oct-09
Event	11-Nov-09
Event Window End	09-Dec-09

Regression Results	
Companies Involved	PPC
ALPHA (Intercept)	0.0001
BETA (Slope)	0.3295
Standard Error	0.0204
R-square	0.0467

Significance 7 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	PPC
Mean	-0.0515
Standard Deviation	0.0281
Sum	-2.1107
Count	41
T-stat	-11.7159
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	0.0000
Significant (p-Value)	Yes

Cross-sectional testing is not applicable given the absence of other industry participants.

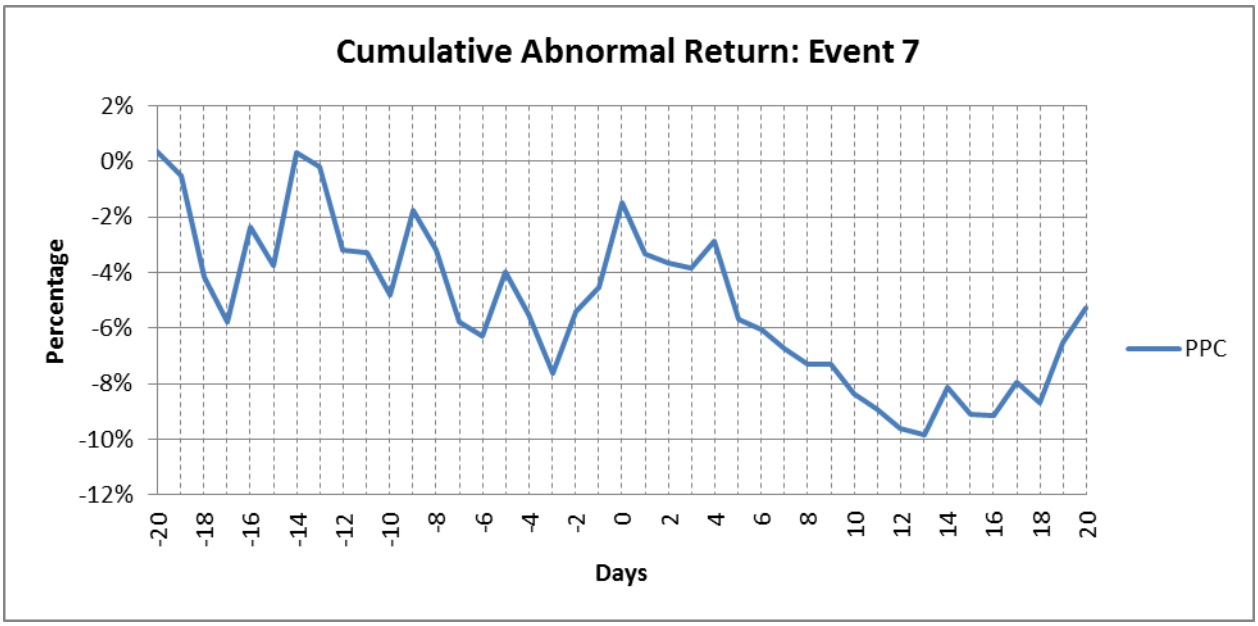


Figure 6: Event 7 CAR reaction

Figure 6 indicates resuscitation in the negative return trend 3 days prior to the announcement on event day 0. The announcement triggers a negative trend in the security in the days after the event.

4.2.4 Event 10

Event 10 formalizes the penalty valuation of Aveng's mining subsidiary, Duraset, to a value of R21.9m for colluding to fix the price of mining roof bolts. In terms of the settlement Duraset admits that it was involved in collusive agreements, arrangements and understandings with DSI (Pty) Ltd and Videx (Pty) Ltd. The penalty handed to Aveng accounts for 5% of Duraset's 2008 annual turnover. The investigation revealed that the cartel may have been started in the 1990's and was resuscitated in 2002 when DSI entered the market.

Regression 10 Output:

Event Dates	
Regression Window Begin	15-Jan-10
Regression Window End	09-Jul-10
Event Window Begin	12-Jul-10
Event	10-Aug-10
Event Window End	07-Sep-10

Regression Results	
Companies Involved	AEG
ALPHA (Intercept)	-0.0010
BETA (Slope)	0.7186
Standard Error	0.0167
R-square	0.2352

Significance 10 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	AEG
Mean	0.0952
Standard Deviation	0.0546
Sum	3.9039
Count	41
T-stat	11.1690
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	2.0000
Significant (p-Value)	No

Cross-sectional testing is not applicable given the absence of other industry participants.

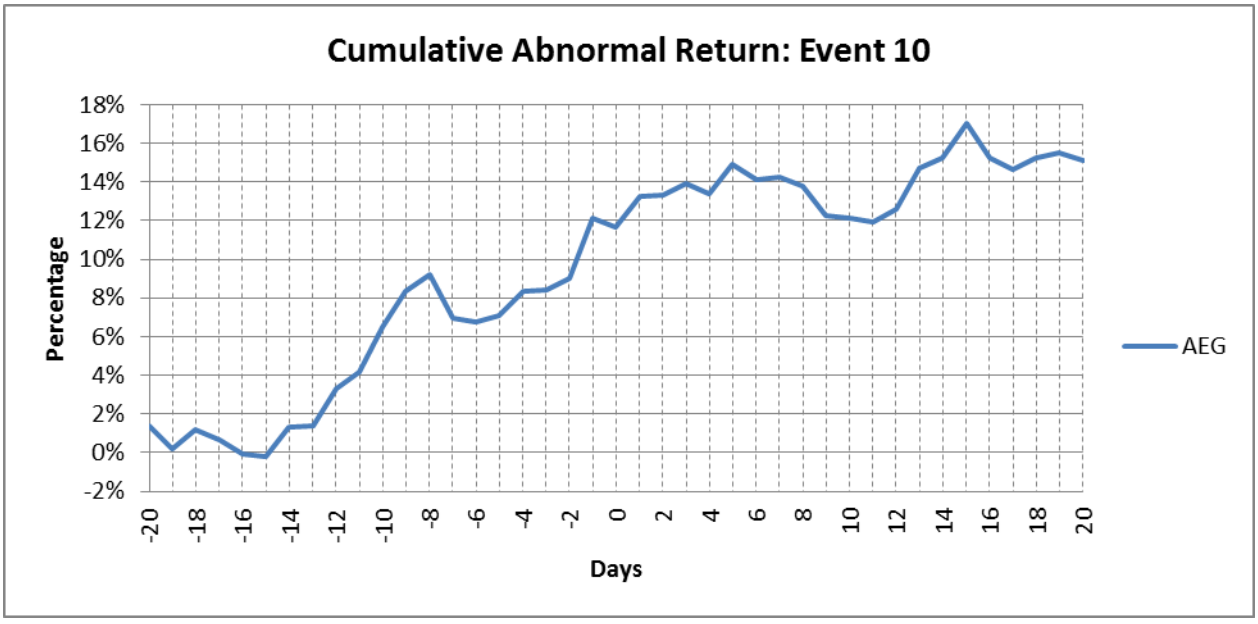


Figure 7: Event 10 CAR reaction

Figure 7 indicates a positive trend in the abnormal return prior to the event day. This positive trend continues despite the negative announcement on event day 0. This positive trend possibly implies that the negativity associated with the announcement was not significant enough to overcome the trend.

4.2.5 Event 21

Event 21 featured an announcement relating to a "fast track settlement" and reduced administrative penalty for the construction companies implicated in the 2010 soccer world cup collusion scandal. The announcement also noted that the firm, Group 5 Pty. LTD, had been assisting the competition commission since 2009 in the investigation and also noted that they had received applications for leniency received from Aveng Grinaker-LTA and Murray and Roberts.

Regression 21 Output:

Event Dates	
Regression Window Begin	13-Jul-10
Regression Window End	03-Jan-11
Event Window Begin	04-Jan-11
Event	01-Feb-11
Event Window End	01-Mar-11

Regression Results		
Companies Involved	AEG	MUR
ALPHA (Intercept)	0.0015	-0.0003
BETA (Slope)	0.5128	0.4863
Standard Error	0.0119	0.0125
R-square	0.1123	0.0934

Significance 21 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0		
Companies Involved	AEG	MUR
Mean	-0.1203	-0.1698
Standard Deviation	0.0900	0.1656
Sum	-4.9309	-6.9610
Count	41	41
T-stat	-8.5557	-6.5638
T-crit	-2.0211	-2.0211
Significant (T-test)	Yes	Yes
p-Value	0.0000	0.0000
Significant (p-Value)	Yes	Yes

Cross-sectional 21 Testing:

Hypothesis Test: Null Hypothesis: CAAR = 0	
Cross Sectional T-test (CAAR)	
Mean	-0.3546
Standard Deviation	0.1684
Sum	-0.7091
Count	2
T-stat	-2.9769
T-crit	-12.7062
Significant (T-test)	No
p-Value	0.2063
Significant (p-Value)	No

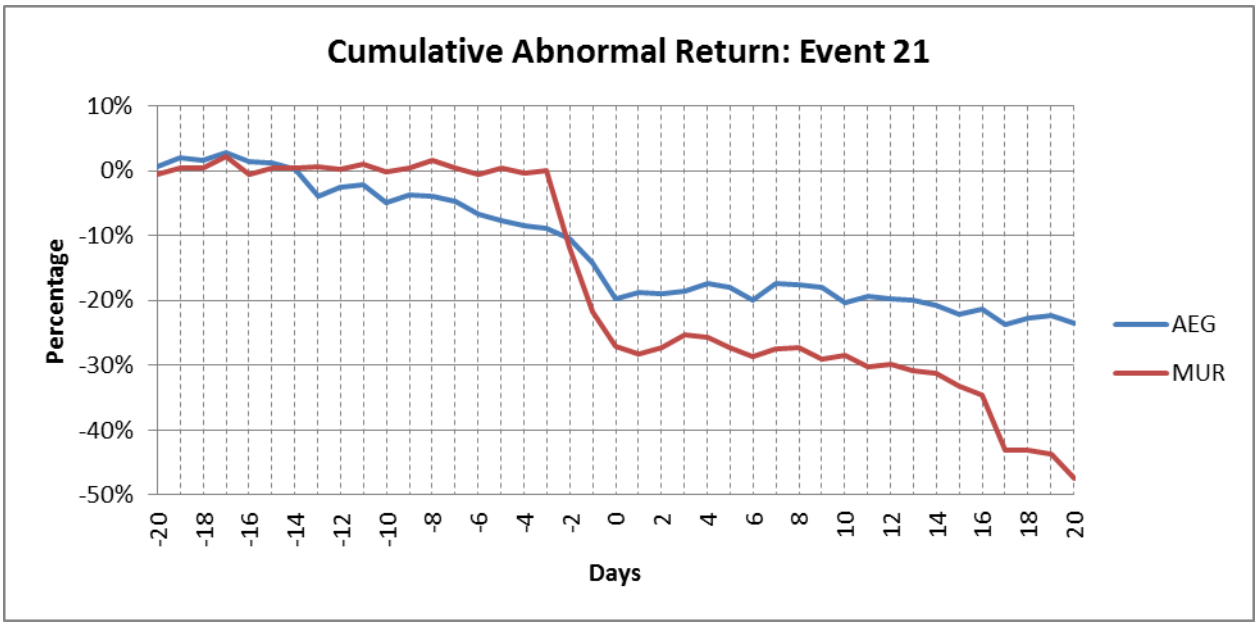


Figure 8: Event 21 CAR reaction

Figure 8 illustrates a significant loss in the share return for the companies Aveng and Murray and Roberts. This negative cycle continues to depreciate in the days after the announcement, on event day 0.

4.2.6 Event 24

The competition commission referred event 24 to the tribunal as it announced that the retail property market had colluded to divide the property market into two deeds of restraint which in turn favoured the allocation of customers and territories to individual retailers. Both the Liberty Group (Pty) Limited and Win Twice Properties (Pty) Limited compete in the retail market in the Bedfordview area via the Eastgate Mall and Bedford Square shopping centres respectively. The investigation established that Bedford Square was restrained from concluding a lease agreement with a major anchor tenants, in violation of the act.

Regression 24 Output:

Event Dates	
Regression Window Begin	26-Aug-10
Regression Window End	15-Feb-11
Event Window Begin	16-Feb-11
Event	16-Mar-11
Event Window End	14-Apr-11

Regression Results	
Companies Involved	LBH
ALPHA (Intercept)	-0.0004
BETA (Slope)	0.5616
Standard Error	0.0092
R-square	0.1977

Significance 24 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	LBH
Mean	-0.0006
Standard Deviation	0.0323
Sum	-0.0247
Count	41
T-stat	-0.1193
T-crit	-2.0211
Significant (T-test)	No
p-Value	0.9056
Significant (p-Value)	No

Cross-sectional testing is not applicable due to the absence of other industry competitors.

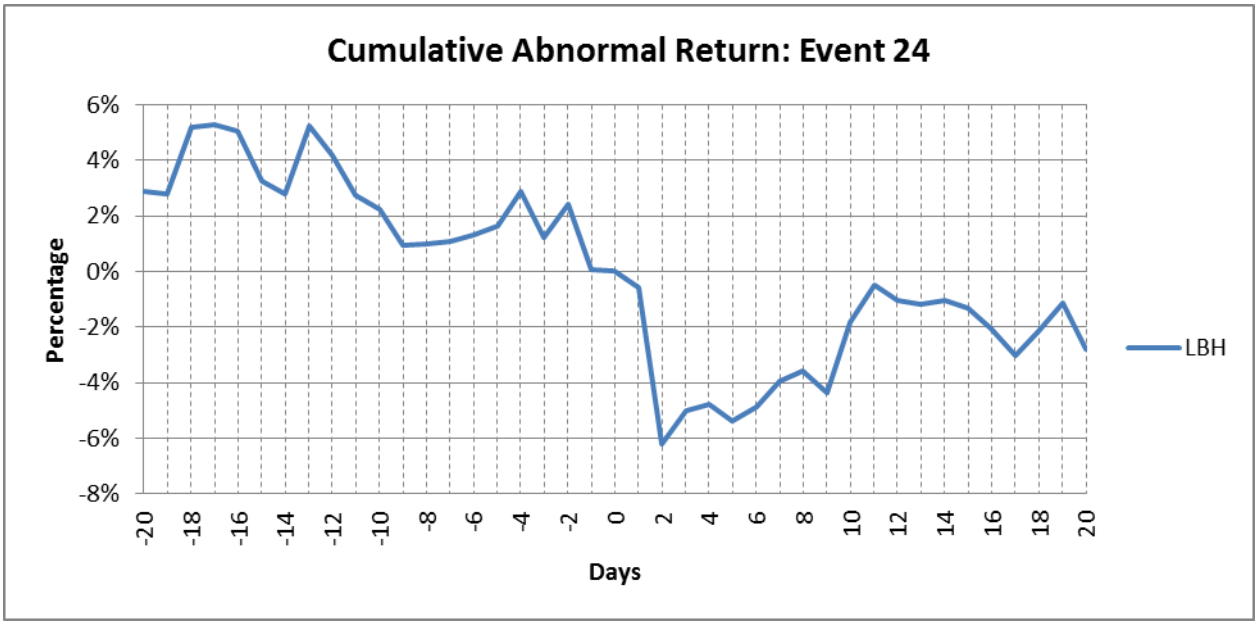


Figure 9: Event 24 CAR reaction

Figure 9 depicts a sharp decline in the company's security on the day of the announcement. The returns subsequently improve in the days proceeding the event.

4.2.7 Event 25

Event 25 announced the penalties associated with price fixing and market allocation for flat steel products. The commission referred the collusion case against Acer-Mittal South Africa Ltd, Highveld Steel and Vanadium Corporation Ltd to the tribunal for adjudication. The investigation followed suit after complaints that the Mittal and Highveld had adjusted their steel prices by a similar margin at a similar time in 2008.

Regression 25 output:

Event Dates	
Regression Window Begin	09-Sep-11
Regression Window End	01-Mar-12
Event Window Begin	02-Mar-12
Event	02-Apr-12
Event Window End	04-May-12

Regression Results		
Companies Involved	ACL	EHS
ALPHA (Intercept)	0.0002	-0.0008
BETA (Slope)	0.9247	0.0217
Standard Error	0.0147	0.0214
R-square	0.3357	0.0001

Significance 25 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0		
Companies Involved	ACL	EHS
Mean	-0.0911	-0.2100
Standard Deviation	0.0475	0.0947
Sum	-3.7351	-8.6107
Count	41	41
T-stat	-12.2800	-14.2063
T-crit	-2.0211	-2.0211
Significant (T-test)	Yes	Yes
p-Value	0.0000	0.0000
Significant (p-Value)	Yes	Yes

Cross-sectional 25 Testing:

Hypothesis Test: Null Hypothesis: CAAR = 0	
Cross Sectional T-test (CAAR)	
Mean	-0.0543
Standard Deviation	0.0749
Sum	-0.2715
Count	2
T-stat	-1.0245
T-crit	-12.7062
Significant (T-test)	No
p-Value	0.4923
Significant (p-Value)	No

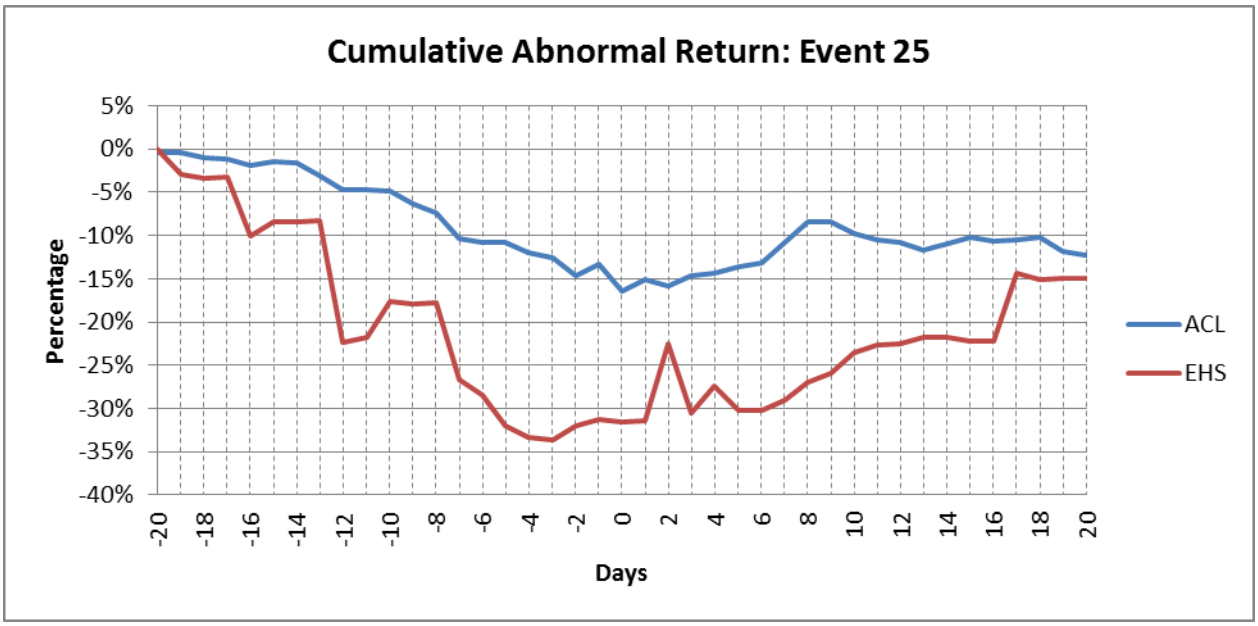


Figure 10: Event 24 CAR reaction

Figure 10 illustrates a downward trend for both companies 20 days' priors to the event day. There is a marginal reaction to the event news on day 0 and some indication of recovery in the 20 days postdating the event.

4.2.8 Event 26

Event 26 deals with well-publicised consent agreements reached with the Competition Commission for all 8 colluding construction companies over the 2010 soccer world cup scandal. Heavy penalties were imposed on all offending companies.

Regression 26 Output:

Event Dates	
Regression Window Begin	27-Dec-12
Regression Window End	21-Jun-13
Event Window Begin	24-Jun-13
Event	22-Jul-13
Event Window End	20-Aug-13

Regression Results								
Companies Involved	AEG	MUR	WBO	GRF	SSK	RBX	BSR	ESR
ALPHA (Intercept)	-0.0005	0.0004	-0.0002	0.0025	0.0006	0.0021	-0.0009	0.0012
BETA (Slope)	0.7100	0.4421	0.4256	0.4017	0.1053	0.2388	0.1493	0.5200
Standard Error	0.0196	0.0143	0.0134	0.0174	0.0170	0.0188	0.0207	0.0313
R-square	0.1062	0.0797	0.0841	0.0461	0.0035	0.0144	0.0047	0.0244

Significance 26 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0								
Companies Involved	AEG	MUR	WBO	GRF	SSK	RBX	BSR	ESR
Mean	0.0163	-0.0203	-0.0047	-0.0107	-0.0379	0.0107	-0.0853	-0.0565
Standard Deviation	0.0591	0.0425	0.0226	0.0329	0.0248	0.0402	0.0472	0.0399
Sum	0.6675	-0.8339	-0.1934	-0.4369	-1.5519	0.4374	-3.4993	-2.3185
Count	41	41	41	41	41	41	41	41
T-stat	1.7627	-3.0651	-1.3392	-2.0751	-9.7715	1.6991	-11.5803	-9.0646
T-crit	-2.0211	-2.0211	-2.0211	-2.0211	-2.0211	-2.0211	-2.0211	-2.0211
Significant (T-test)	No	Yes	No	Yes	Yes	No	Yes	Yes
p-Value	1.9144	0.0039	0.1881	0.0445	0.0000	1.9029	0.0000	0.0000
Significant (p-Value)	No	Yes	No	Yes	Yes	No	Yes	Yes

Cross-sectional 26 Testing:

Hypothesis Test: Null Hypothesis: CAAR = 0	
Cross Sectional T-test (CAAR)	
Mean	-0.0399
Standard Deviation	0.0461
Sum	-0.3191
Count	8
T-stat	-2.4449
T-crit	-2.3646
Significant (T-test)	Yes
p-Value	0.0444
Significant (p-Value)	Yes

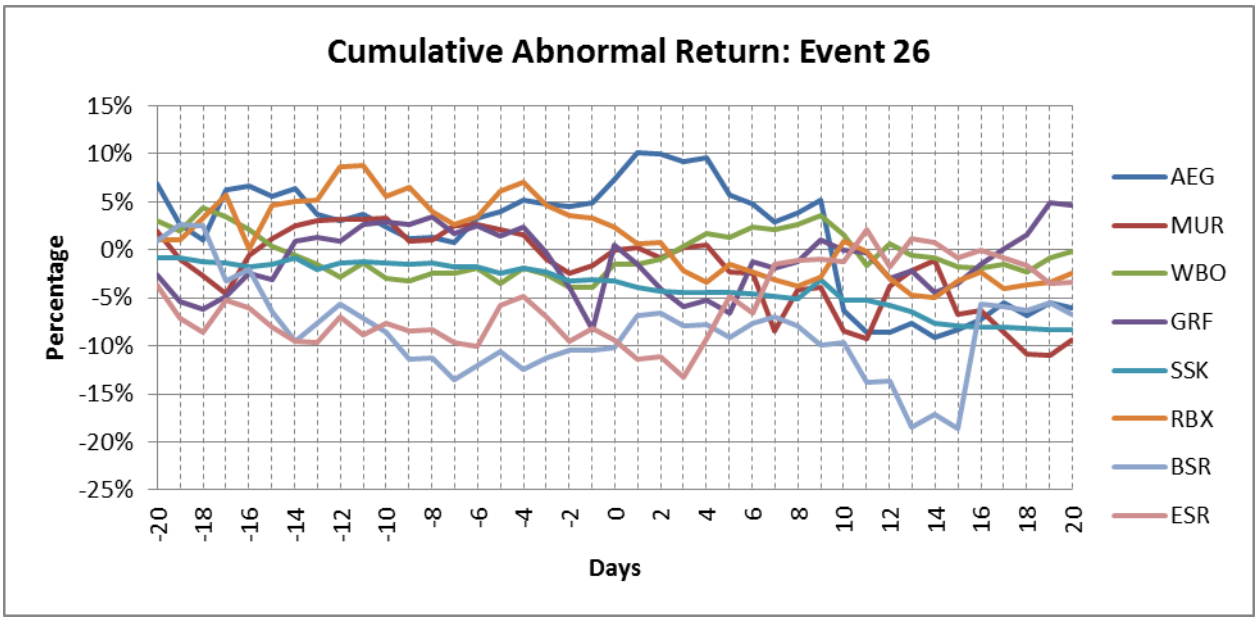


Figure 11: Event 26 CAR reaction

4.3 Events Occurring within the Petrochemical Sector

The petrochemical sector accounted for 7 of the 26 collusive events listed in Table 10. This represents the second most prominent collusive sector in South Africa with 27% of the count. Publically listed information was available for all 6 of the events as listed in Table 3 below:

Event no.	Date	Ticker	Listed: Information available	Industry	Company
3	06-May-09	SOL	Yes	Petrochemical	Sasol
4	19-May-09	SOL	Yes	Petrochemical	Sasol
8	05-Jul-10	SOL	Yes	Petrochemical	Sasol
9	04-Aug-10		No	Petrochemical	Foskor
11	12-Aug-10	SOL	Yes	Petrochemical	Sasol
19	14-Dec-10	SOL	Yes	Petrochemical	Sasol
23	28-Feb-11	SOL	Yes	Petrochemical	Sasol Chemical Industries

Table 3: Petrochemical sector events

Events 3, 4, 8, 11, 19, and 23 have been analysed in the study and presented herein.

4.3.1 Event 3

Event 3 documents the settlement of R188m between Sasol and the competition commission for Sasol's inclusion in a fertiliser cartel. This fine represents the highest settlement reached with the commission and was based on 6% of the annual turnover to the Sasol nitro division. The complaint was filed by Nutri-grow, a smaller blender and distributer of fertiliser.

Regression 3 Output:

Event Dates	
Regression Window Begin	08-Oct-08
Regression Window End	31-Mar-09
Event Window Begin	01-Apr-09
Event	06-May-09
Event Window End	03-Jun-09

Regression Results	
Companies Involved	SOL
ALPHA (Intercept)	0.0014
BETA (Slope)	1.4028
Standard Error	0.0248
R-square	0.7130

Significance 3 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	SOL
Mean	-0.0779
Standard Deviation	0.0343
Sum	-3.1959
Count	41
T-stat	-14.5697
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	0.0000
Significant (p-Value)	Yes

Cross-sectional testing is not available due to the absence of other industry conspirators.

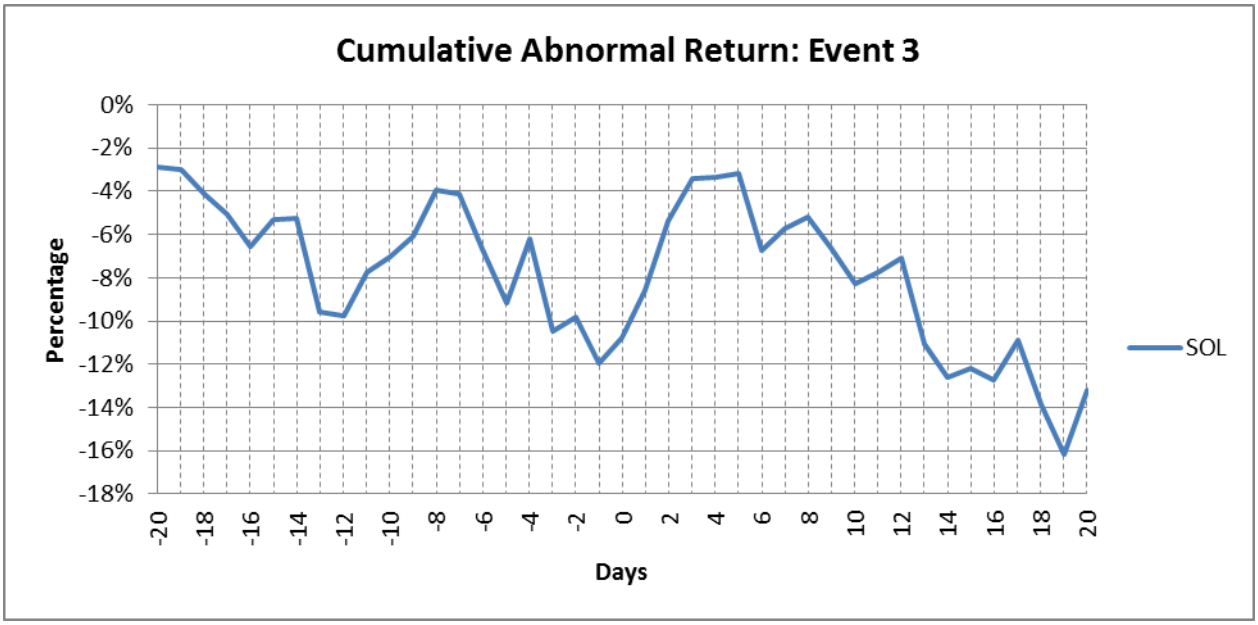


Figure 12: Event 3 CAR reaction

Figure 12 illustrates a relatively significant disruption on the event day, followed by a sharp recovery in the return and then a resumption of the decline.

4.3.2 Event 4

Sasol internal investigations confirm the competition commission's findings discussed in event 3, which fully contravene the Competition Act. As a result the penalty is increased from 6% of the annual revenue to 8% of the revenue over the same period. This represents an increase from R188m to R250m. The commission's approach is to incentivise timeous and full disclosure of any uncompetitive behaviour. Sasol's internal investigations are viewed as being extremely late and leniency is therefore not considered.

Regression 4 Output:

Event Dates	
Regression Window Begin	21-Oct-08
Regression Window End	15-Apr-09
Event Window Begin	16-Apr-09
Event	19-May-09
Event Window End	17-Jun-09

Regression Results	
Companies Involved	SOL
ALPHA (Intercept)	0.0001
BETA (Slope)	1.3616
Standard Error	0.0226
R-square	0.7207

Significance 4 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	SOL
Mean	0.0351
Standard Deviation	0.0270
Sum	1.4397
Count	41
T-stat	8.3417
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	2.0000
Significant (p-Value)	No

Cross-sectional testing is not available due to the absence of other industry conspirators.

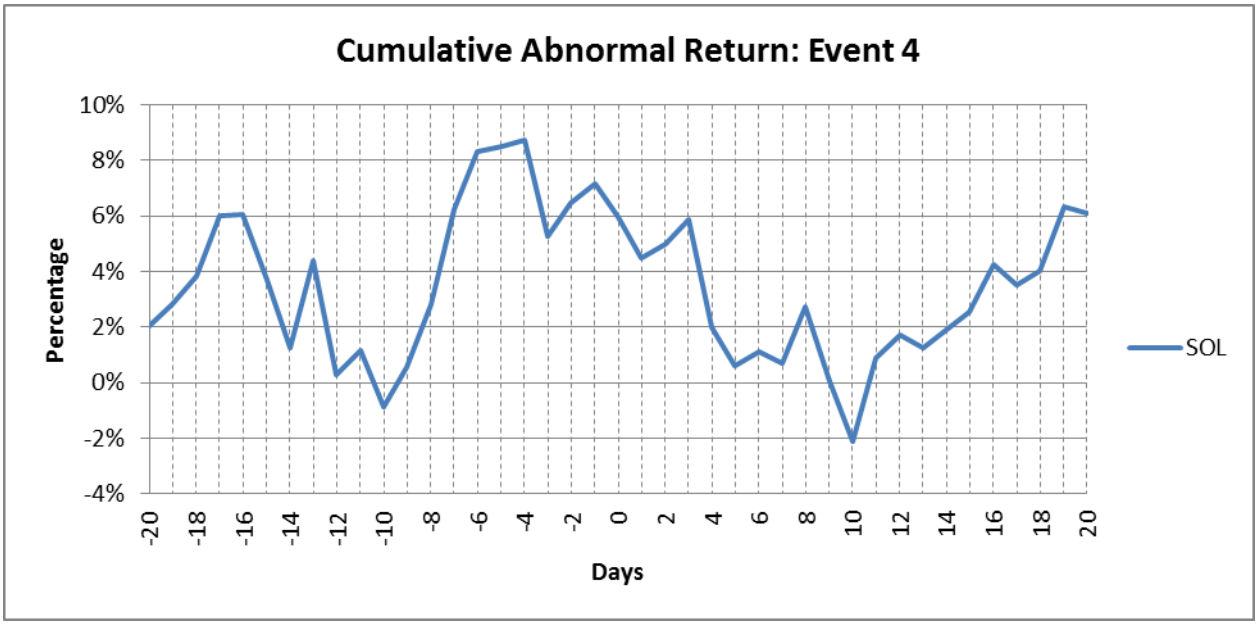


Figure 13: Event 4 CAR reaction

Figure 13 illustrates a downward trend on the announcement day, event window 0. The returns show signs of recovery after approximately two trading weeks after the announcement.

4.3.3 Event 8

Following the collusive announcements made in event 3 and including the heavy R250m penalty imposed in event 4, Sasol reaches and agreement with the Competition Commission to divest 5 of its fertiliser blending facilities. The settlement relates to Sasol's abuse of dominance, exclusionary conduct and price discrimination in the supply of ammonia and its derivative products. In terms of the agreement, Sasol are to divest 5 of their ammonia nitrate facilities, excluding their flagship Secunda facility, within 12 months of the agreement.

Regression 8 Output:

Event Dates	
Regression Window Begin	08-Dec-09
Regression Window End	03-Jun-10
Event Window Begin	04-Jun-10
Event	05-Jul-10
Event Window End	02-Aug-10

Regression Results	
Companies Involved	SOL
ALPHA (Intercept)	-0.0004
BETA (Slope)	0.8794
Standard Error	0.0111
R-square	0.4694

Significance 8 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	SOL
Mean	0.0127
Standard Deviation	0.0106
Sum	0.5198
Count	41
T-stat	7.6830
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	2.0000
Significant (p-Value)	No

Cross-sectional testing is not available due to the absence of other industry conspirators.

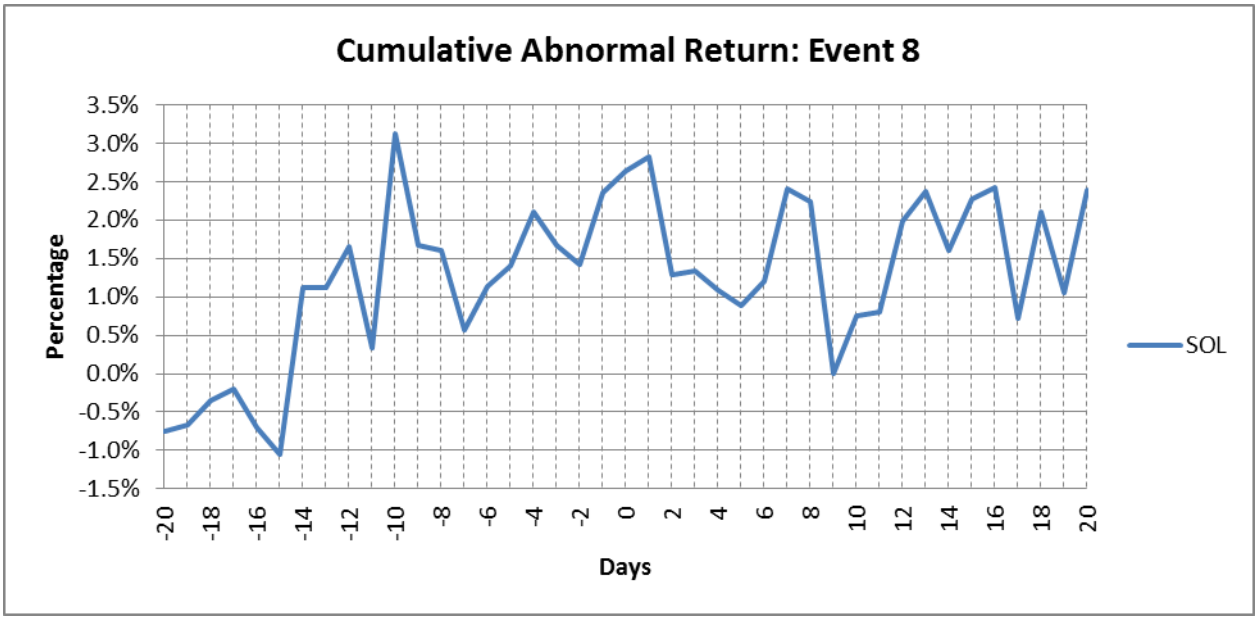


Figure 14: Event 8 CAR reaction

Figure 14 shows no significant trends preceding or postdating the announcement.

4.3.4 Event 11

The commission referred a case between Sasol and Safripol for collusion and excessive pricing in the polymers market. A case was instituted in 2007 following complaints from the department of trade and industry (DTi) relating to the pricing of polymers and its negative impact on diversified growth and employment in the manufacturing industry. The commission found that Sasol had charged excessive prices for the polymer products in line with import parity pricing. Furthermore, it concluded that Sasol and Safripol had colluded in the supply agreement and implementation of the pricing strategy. A penalty representing 10% of the annual turnover was sought from the offending parties.

Regression 11 Output:

Event Dates	
Regression Window Begin	19-Jan-10
Regression Window End	13-Jul-10
Event Window Begin	14-Jul-10
Event	12-Aug-10
Event Window End	09-Sep-10

Regression Results	
Companies Involved	SOL
ALPHA (Intercept)	-0.0002
BETA (Slope)	0.9131
Standard Error	0.0105
R-square	0.5606

Significance 11 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	SOL
Mean	0.0104
Standard Deviation	0.0109
Sum	0.4253
Count	41
T-stat	6.1108
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	2.0000
Significant (p-Value)	No

Cross-sectional testing is not available due to the absence of other industry conspirators.

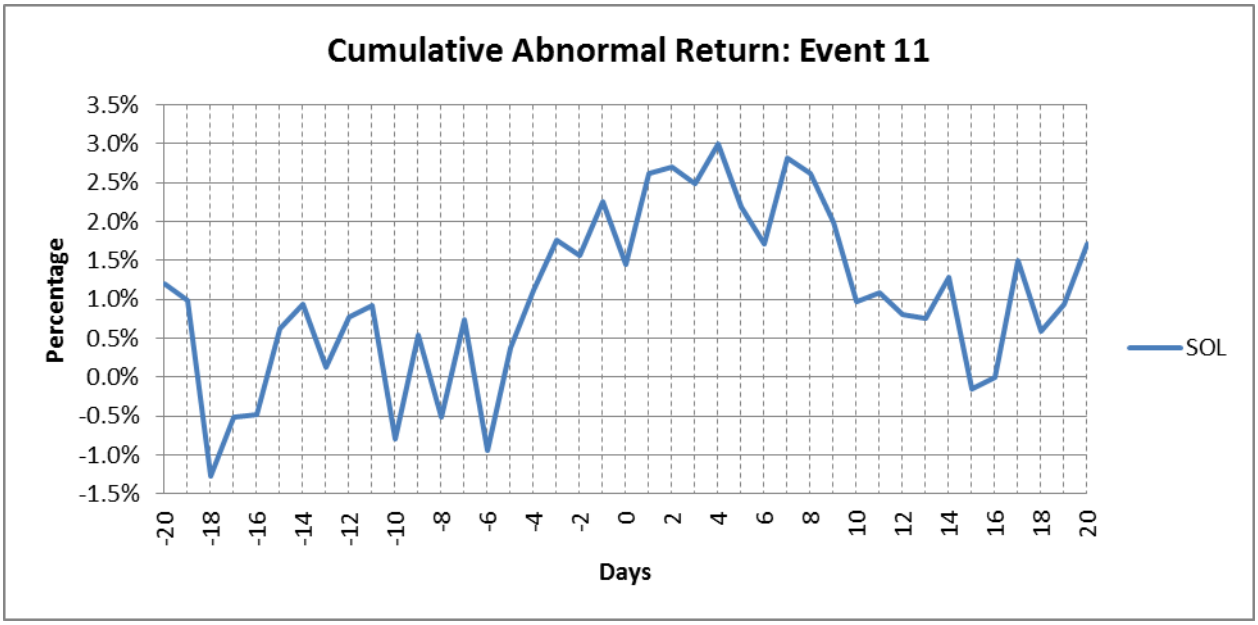


Figure 15: Event 11 CAR reaction

Figure 15 depicts a relatively insignificant change in the share returns around the event announcement. Initially, an increase is observed over the 4 days after the announcement but then normalise toward the 0% mark toward the end of the window period.

4.3.5 Event 19

Event 19 formalises the settlement amount described in event 11, whereby Sasol and Safripol conspire to fix pricing in the polymer market. Sasol Polymers agreed to pay 3% of their annual

turnover derived from polymer products, approximately R111m, in all aspects discussed in event 11.

Regression 19 Output:

Event Dates	
Regression Window Begin	26-May-10
Regression Window End	15-Nov-10
Event Window Begin	16-Nov-10
Event	14-Dec-10
Event Window End	13-Jan-11

Regression Results	
Companies Involved	SOL
ALPHA (Intercept)	0.0003
BETA (Slope)	1.0434
Standard Error	0.0096
R-square	0.5219

Significance 19 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	SOL
Mean	-0.0117
Standard Deviation	0.0109
Sum	-0.4792
Count	41
T-stat	-6.8603
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	0.0000
Significant (p-Value)	Yes

Cross-sectional testing is not available due to the absence of other industry conspirators.

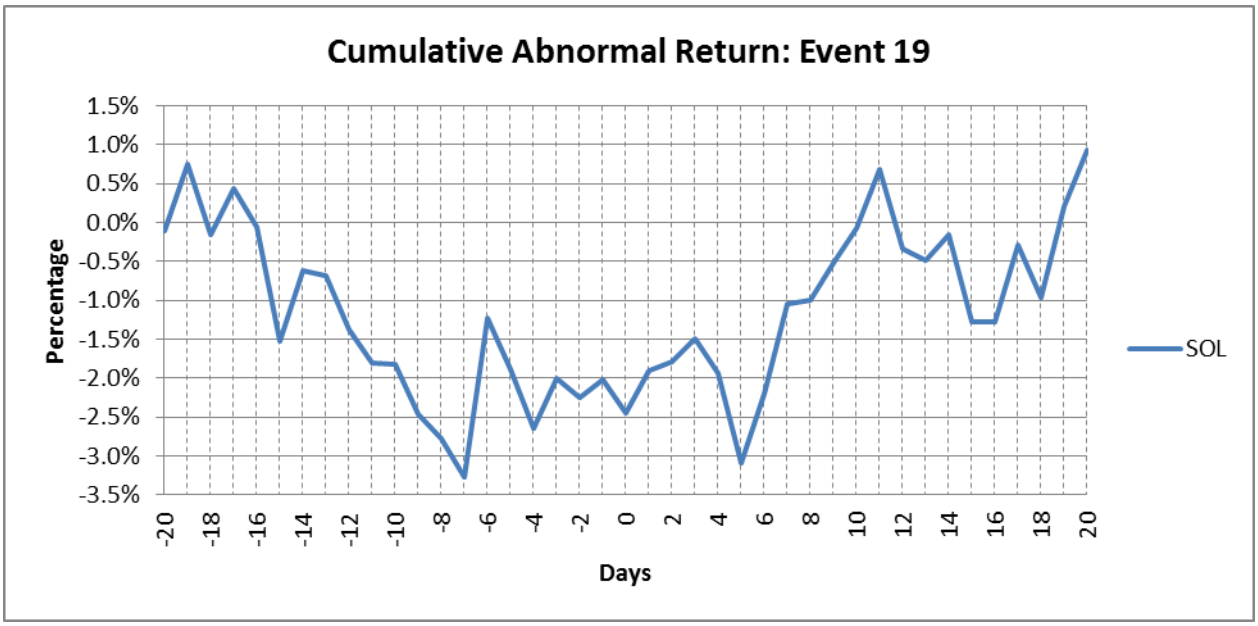


Figure 16: Event 19 CAR reaction

4.3.6 Event 23

Event 23 documents minor amendments to the consent agreement noted in event 19 by introducing terms of payment as well as introducing a mechanism to police the implementation of the terms of settlement. The accord requires Sasol to pay R6m within 60 days of the notification and appoints the commission to enforce the agreement.

Regression 23 Output:

Event Dates	
Regression Window Begin	10-Aug-10
Regression Window End	28-Jan-11
Event Window Begin	31-Jan-11
Event	28-Feb-11
Event Window End	29-Mar-11

Regression Results	
Companies Involved	SOL
ALPHA (Intercept)	0.0006
BETA (Slope)	0.9347
Standard Error	0.0088
R-square	0.4464

Significance 23 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	SOL
Mean	0.0389
Standard Deviation	0.0253
Sum	1.5958
Count	41
T-stat	9.8606
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	2.0000
Significant (p-Value)	No

Cross-sectional testing is not available due to the absence of other industry conspirators.

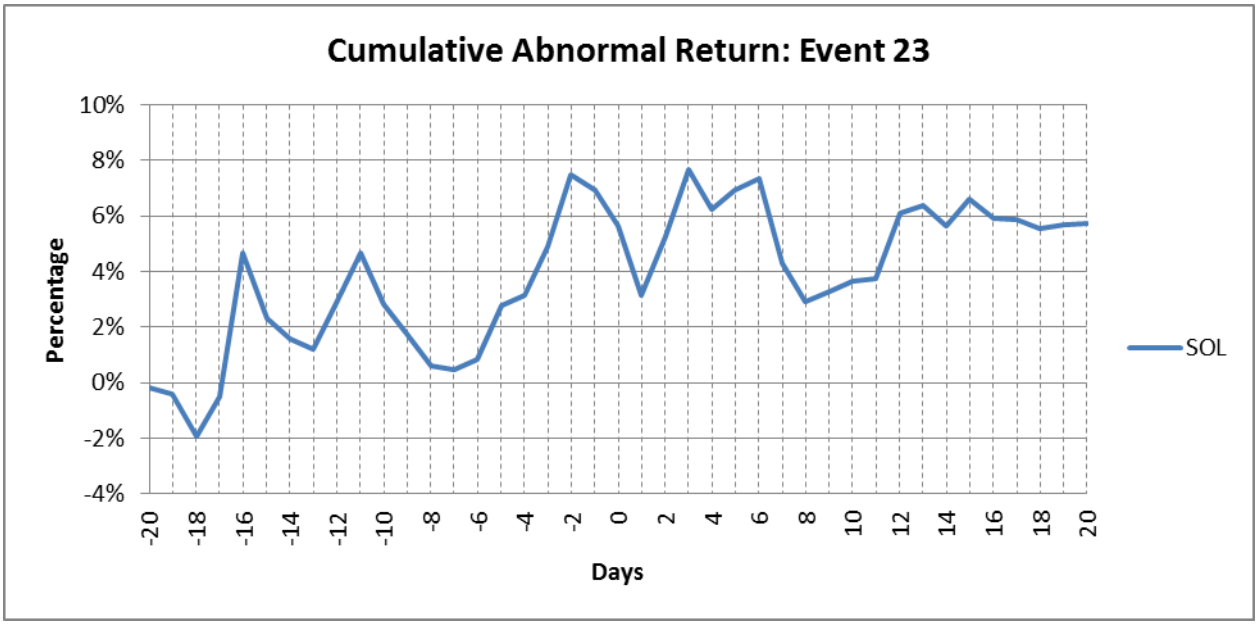


Figure 17: Event 23 CAR reaction

4.4 Events Occurring within the Food and Beverage Sector

The food and beverage sector accounted for 5 of the 26 collusive events listed in Table 10. This represents the third most prominent collusive sector with 20% of the count. Publically listed information was available for all 5 of the events as listed in Table 4 below:

Event no.	Date	Ticker	Listed: Information available	Industry	Company
5	29-Jun-09	PIK SHP WHL SPP MSM	Yes Yes Yes Yes Yes No	Food and Bev	Pick n Pay Shoprite/Checkers Woolworths Spar Massmart Metcash
15	02-Nov-10	PIO	Yes	Food and Bev	Pioneer Foods
17	22-Nov-10	PIO	Yes	Food and Bev	Pioneer Foods
18	24-Nov-10	PIO	Yes	Food and Bev	Pioneer Food
20	27-Jan-11	PIK SHP WHL SPP MSM	Yes Yes Yes Yes Yes No	Food and Bev	Pick n Pay Shoprite/Checkers Woolworths Spar Massmart Metcash

Table 4: Food and beverage sector events

Events 5, 15, 17, 18, and 20 have been analysed in the study and presented herein.

4.4.1 Event 5

The competition commission announces an investigation into the supermarket industry for alleged contraventions to the Competition Act. The investigation includes major South African supermarket chains; Pick n Pay, Shoprite/Checkers, Woolworths and Spar as well as wholesaler-retailers Massmart and Metcash. Investigations into the food and agro processing sector emerged from the general public and varying stakeholders. The commission identified several potential concerns ranging from the concentration of buyer power to long term exclusive lease agreements.

Regression 5 Output:

Event Dates	
Regression Window Begin	28-Nov-08
Regression Window End	28-May-09
Event Window Begin	29-May-09
Event	29-Jun-09
Event Window End	27-Jul-09

Regression Results					
Companies Involved	PIK	SHP	WHL	SPP	MSM
ALPHA (Intercept)	0.0004	0.0017	0.0007	0.0005	0.0000
BETA (Slope)	0.4557	0.3451	0.5936	0.3139	0.2931
Standard Error	0.0212	0.0193	0.0209	0.0196	0.0245
R-square	0.1804	0.1322	0.2781	0.1089	0.0636

Significance 5 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0					
Companies Involved	PIK	SHP	WHL	SPP	MSM
Mean	0.0029	-0.0255	0.0314	-0.0078	0.0144
Standard Deviation	0.0285	0.0225	0.0510	0.0189	0.0325
Sum	0.1203	-1.0457	1.2858	-0.3179	0.5904
Count	41	41	41	41	41
T-stat	0.6595	-7.2581	3.9384	-2.6247	2.8370
T-crit	-2.0211	-2.0211	-2.0211	-2.0211	-2.0211
Significant (T-test)	No	Yes	Yes	Yes	Yes
p-Value	1.4867	0.0000	1.9997	0.0122	1.9929
Significant (p-Value)	No	Yes	No	Yes	No

Cross-sectional 5 Testing:

Hypothesis Test: Null Hypothesis: CAAR = 0	
Cross Sectional T-test (CAAR)	
Mean	0.0078
Standard Deviation	0.0713
Sum	0.0388
Count	5
T-stat	0.2437
T-crit	-2.7764
Significant (T-test)	No
p-Value	1.1806

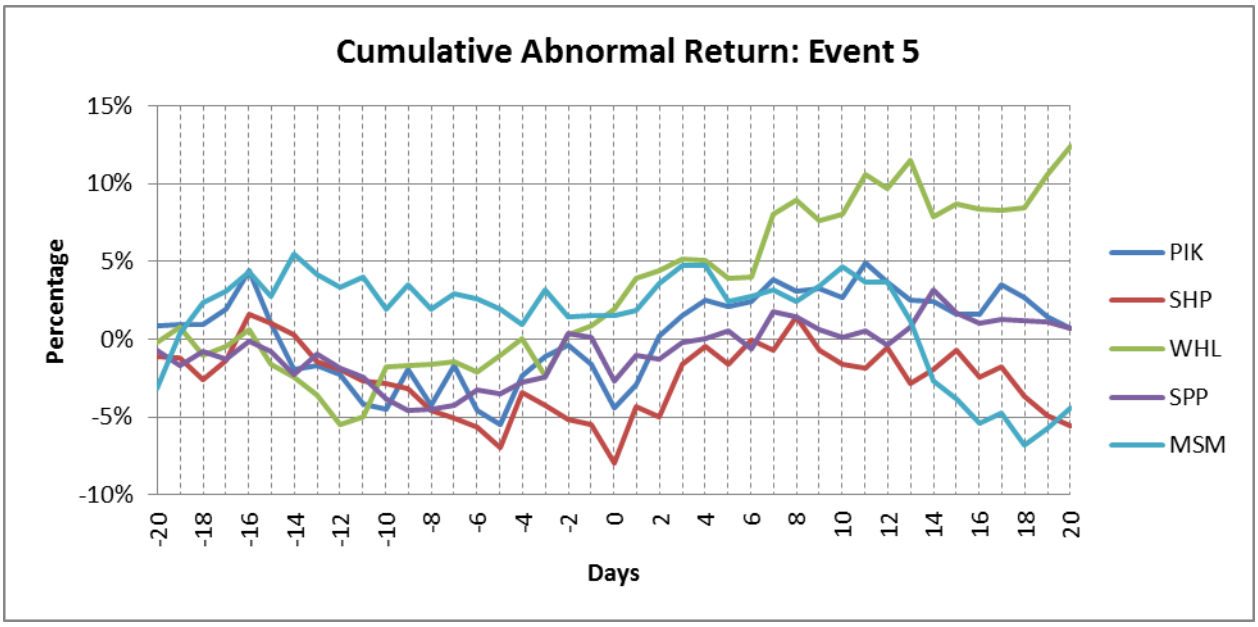


Figure 18: Event 5 CAR reaction

Figure 18 depicts a relatively constant volatility before the event date. The returns become more diversified after the announcement but offer no cross sectional significance.

4.4.2 Event 15

The event publicises the settlement between the competition commission and Pioneer foods. Pioneer foods were found guilty of adjusting the price of pricing flour and bread to reduce its

gross margin by R160m. Their anti-competitive behaviour negatively impacted the consumer and and the ability of small to medium sized firms enter and grow in the market. Pioneer agreed to settle R250m as an administration penalty to the National Revenue Fund as well as paying R250m to an Agro-processing Competitiveness fund.

Regression 15 Output:

Event Dates	
Regression Window Begin	13-Apr-10
Regression Window End	04-Oct-10
Event Window Begin	05-Oct-10
Event	02-Nov-10
Event Window End	30-Nov-10

Regression Results	
Companies Involved	PFG
ALPHA (Intercept)	0.0022
BETA (Slope)	0.3097
Standard Error	0.0165
R-square	0.0559

Significance 15 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	PFG
Mean	-0.0549
Standard Deviation	0.0362
Sum	-2.2517
Count	41
T-stat	-9.7052
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	0.0000
Significant (p-Value)	Yes

Cross-sectional testing is not available due to the absence of other industry conspirators.

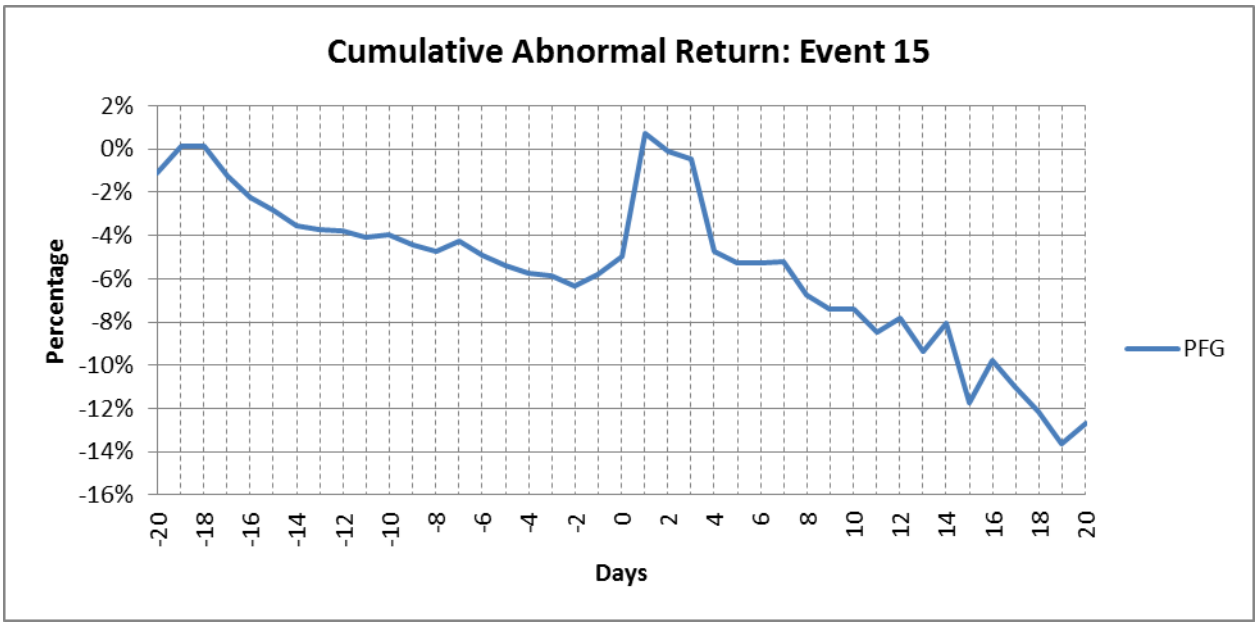


Figure 19: Event 15 CAR reaction

Figure 19 indicates a negative trend in the days leading up to the event day, a volatile rebound on the day of the announcement and then resumption in the negative cycle.

4.4.3 Event 17

Event 17 publically announces the agreement to settle eight separate investigations undertaken by the commission to involving transgressions by Pioneer Foods against the Competitions Act. The investigations involved maize and wheat milling, baking, poultry and egg industries. The conduct ranged from collusion, unlawful information sharing and predatory pricing.

Regression 17 Output:

Event Dates	
Regression Window Begin	04-May-10
Regression Window End	22-Oct-10
Event Window Begin	25-Oct-10
Event	22-Nov-10
Event Window End	21-Dec-10

Regression Results	
Companies Involved	PFG
ALPHA (Intercept)	0.0018
BETA (Slope)	0.2860
Standard Error	0.0164
R-square	0.0445

Significance 17 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	PFG
Mean	-0.0103
Standard Deviation	0.0416
Sum	-0.4225
Count	41
T-stat	-1.5861
T-crit	-2.0211
Significant (T-test)	No
p-Value	0.1206
Significant (p-Value)	No

Cross-sectional testing is not available due to the absence of other industry conspirators.

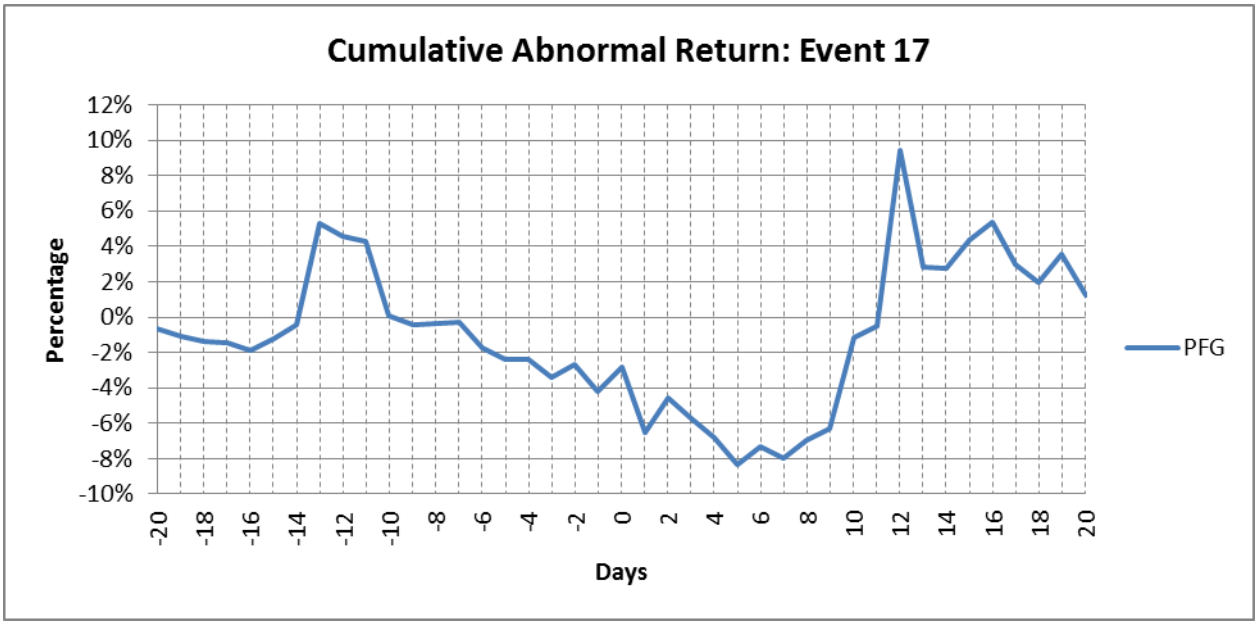


Figure 20: Event 17 CAR reaction3

Figure 20 illustrate a continuation of the downward trend around the event day and a sudden spike in the return two weeks after the event. These results are however proven to be statistically insignificant.

4.4.4 Event 18

Pioneer foods is granted conditional leniency after agreeing to pay R250m to the National Revenue Fund as an administrative penalty as well as R250 to establish an Agro-processing competitive fund. Furthermore, Pioneer agrees to adjust its pricing of flour and bread such as to reduce its gross margin. The present settlement agreement excludes the R195m fine imposed for Pioneer's participation in cartel activities in the bread industry.

Regression 18 Output:

Event Dates	
Regression Window Begin	06-May-10
Regression Window End	26-Oct-10
Event Window Begin	27-Oct-10
Event	24-Nov-10
Event Window End	23-Dec-10

Regression Results	
Companies Involved	PFG
ALPHA (Intercept)	0.0017
BETA (Slope)	0.2867
Standard Error	0.0164
R-square	0.0443

Significance 18 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Companies Involved	PFG
Mean	0.0043
Standard Deviation	0.0429
Sum	0.1769
Count	41
T-stat	0.6444
T-crit	-2.0211
Significant (T-test)	No
p-Value	1.4770
Significant (p-Value)	No

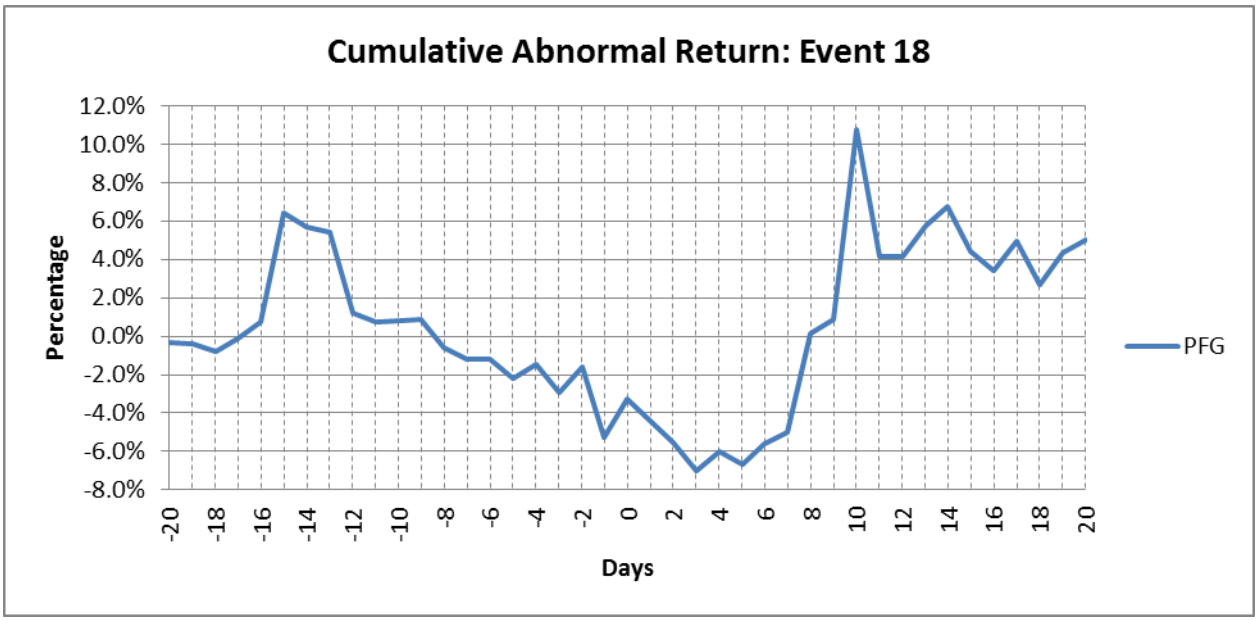


Figure 21: Event 18 CAR reaction

4.4.5 Event 20

The competition commission revealed its findings of the industry probe into four major South African retailers and two international wholesalers. The supermarket investigation followed from the commissions prioritisation of food markets in the context of the public perception of high grocery prices, high market concentration and significant barriers to entry of the major retailers. Several competition concerns were highlighted throughout the investigation, namely:

1. Exclusive lease agreements.
2. Information exchange.
3. Abuse of power and exclusive pricing.
4. Category management in relation to product, payment, promotion and price.

Regression 20 Output:

Event Dates	
Regression Window Begin	08-Jul-10
Regression Window End	29-Dec-10
Event Window Begin	30-Dec-10
Event	27-Jan-11
Event Window End	24-Feb-11

Regression Results					
Companies Involved	PIK	SHP	WHL	SPP	MSM
ALPHA (Intercept)	-0.0001	0.0004	-0.0001	0.0008	0.0010
BETA (Slope)	0.6403	0.7470	0.6039	0.4784	0.5183
Standard Error	0.0087	0.0108	0.0121	0.0099	0.0135
R-square	0.2716	0.2476	0.1464	0.1378	0.0919

Significance 20 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0					
Companies Involved	PIK	SHP	WHL	SPP	MSM
Mean	-0.0586	-0.0801	-0.0685	-0.0528	-0.0388
Standard Deviation	0.0414	0.0311	0.0513	0.0310	0.0247
Sum	-2.4014	-3.2853	-2.8070	-2.1645	-1.5902
Count	41	41	41	41	41
T-stat	-9.0666	-16.4737	-8.5408	-10.8917	-10.0407
T-crit	-2.0211	-2.0211	-2.0211	-2.0211	-2.0211
Significant (T-test)	Yes	Yes	Yes	Yes	Yes
p-Value	0.0000	0.0000	0.0000	0.0000	0.0000
Significant (p-Value)	Yes	Yes	Yes	Yes	Yes

Cross-sectional 20 Testing:

Hypothesis Test: Null Hypothesis: CAAR = 0	
Cross Sectional T-test (CAAR)	
Mean	-0.0656
Standard Deviation	0.0121
Sum	-0.3278
Count	5
T-stat	-12.1508
T-crit	-2.7764
Significant (T-test)	Yes
p-Value	0.0003
Significant (p-Value)	Yes

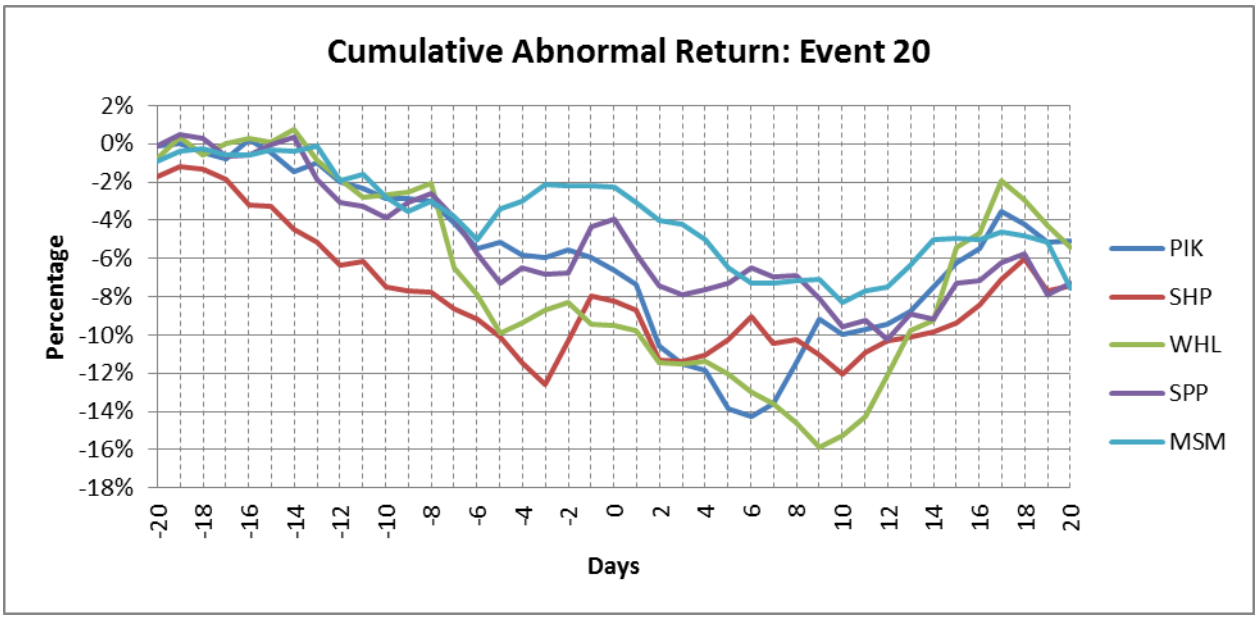


Figure 22: Event 20 CAR reaction

Figure 22 shows a typical downward trend affecting all competitors. Both individual and cross-sectional significance can is evident in this event.

4.5 Events Occurring within the Pharmaceutical Sector

The competition commission submitted papers to the competition tribunal on the 11 February 2008 with regards to collusive practices within the pharmaceutical sector. Adcock Ingram, Listed information was available for 1 of the 3 alleged firms, namely Adcock Ingram Critical Care, Dismed Criticare and Thusanong Health Care were implicated in the scandal and subject to legal action by the tribunal. The Directors of Tiger Brands Pty LTD were also allegedly involved in the scandal for knowing about the collusion but doing nothing about it. The investigations had been ongoing since 2005 with the help of Fresenius Kabi South Africa, who were afforded leniency for their role in bringing the investigations to a head.

Event 1

Regression 1 Output:

Event Dates	
Regression Window Begin	19-Jul-07
Regression Window End	11-Jan-08
Event Window Begin	14-Jan-08
Event	11-Feb-08
Event Window End	10-Mar-08

Regression Results	
Company Involved	TBS
ALPHA (Intercept)	-0.0015
BETA (Slope)	0.5824
Standard Error	0.0121
R-square	0.3222

Significance 1 Testing:

Hypothesis Test: Null Hypothesis: CAR = 0	
Company Involved	TBS
Mean	-0.0765
Standard Deviation	0.0706
Sum	-3.1350
Count	41
T-stat	-6.9391
T-crit	-2.0211
Significant (T-test)	Yes
p-Value	0.0000
Significant (p-Value)	Yes

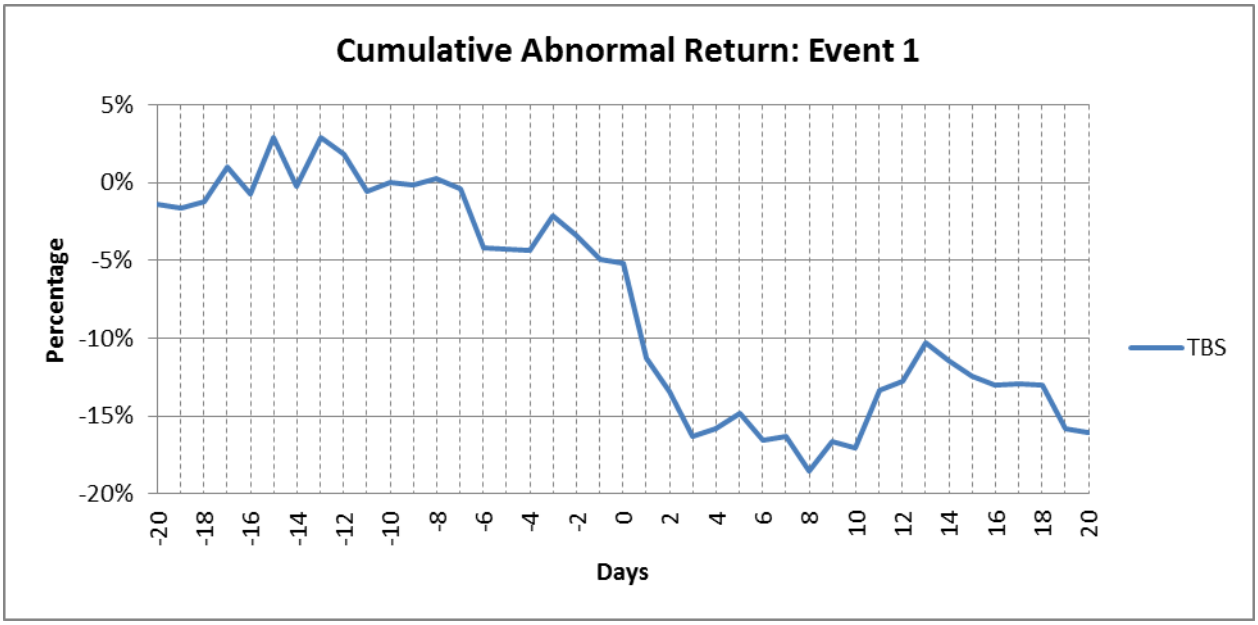


Figure 23: Event 1 CAR reaction

4.6 Results Pertaining to Question Two

H1: The valuation change to the stock price will always be negative.

The second research question sought to establish if the firm's valuation change in the security would always be negative given the negative association with the announcement. Table 5 summarises the t-stat distribution of all the events and highlights the cells according to their polarity. The green highlighted cells indicate a positive reflection in the CAR return and the red highlighted cells prescribe a negative change to the firms share return associated with the event.

		T-stat results per event							
		Company 1	Company 2	Company 3	Company 4	Company 5	Company 6	Company 7	Company 8
Construction Sector	Event 2	-4.6526							
	Event 6	2.6022	6.4279	0.8726	9.2044	-4.2898	-6.8392	13.9861	-4.7502
	Event 7	-11.7159							
	Event 10	11.1690							
	Event 21	-8.5557	-6.5638						
	Event 24	-0.1193							
	Event 25	-12.2800	-14.2063						
	Event 26	1.7627	-3.0651	-1.3392	-2.0751	-9.7715	1.6991	-11.5803	-9.0646
Petrochemical Sector	Event 3	-14.5697							
	Event 4	8.3417							
	Event 8	7.6830							
	Event 11	6.1108							
	Event 19	-6.8603							
	Event 23	9.8606							
F&B Sector	Event 5	0.6595	-7.2581	3.9384	-2.6247	2.8370			
	Event 15	-9.7052							
	Event 17	-1.5861							
	Event 18	7.6830							
	Event 20	-9.0666	-16.4737	-8.5408	-10.8917	-10.0407			
Pharma	Event 1	-6.9391							

Table 5: t-stat distribution

	Construction Sector	Petrochemical Sector	Food and Beverage Sector	Pharmaceutical Sector
Up	33%	67%	36%	
Down	67%	33%	64%	

Table 6: Share price reaction to event news

Table 6 reflects the market's reaction to the news as a reflected by the increase or decrease in the share return. Roughly two thirds of the markets react negatively to the event news throughout the construction and food and agro sectors, whilst the opposite is true for the petrochemical sector. Only one event was analysed within the pharmaceutical sector and can therefore not draw any meaningful conclusion from the event.

4.7 Summary of Findings

This chapter has presented the results of the study as they occurred. In order to answer the first research question the study categorised each event into an appropriate sector and analysed the event as per the methodology prescribed in Chapter 3. A regression analysis was conducted on each event to obtain the abnormal and cumulative abnormal returns of the firms before applying the t-test for individual significance and, where applicable, the cross-sectional t-test for industry significance. A graph plotting the reaction of the event was also attached in as a part of the results.

The second research question sought to ascertain if the negative announcement would always deliver a negative valuation change in the firm's stock value. The t-statistic was tabulated in for each event and tabulated in Table 5. The table colour coded the polarity of the t-statistic given the positive or negative change.

These results will be discussed in further detail in Chapter 5.

CHAPTER 5: DISCUSSION OF THE RESULTS

This chapter interprets the results presented in Chapter 4 and provides discussion around the economic and practical meaning of the outcomes. The discussion of the event findings are grouped into the varying industries namely, construction, food and beverage, petrochemical and pharmaceutical and tabled herein.

5.1 Discussion Pertaining to Research Question One

The event study was implemented to 20 of the 26 collusive events tabled in Table 10, representing 77% of the original population. Six event dates were discarded due to a lack of publically available information. Of the 20 events identified, 43 firms were studied across 4 different sectors of the economy.

The first research question sought to understand if the share return of a firm would be significantly affected after the release of a collusive announcement, given the negativity surrounding collusion and corruption. The statistical significance of this question was tested through the t-test at a 5% confidence interval, as discussed in Chapter 3.

The research question *H0* hypothesised that "*A firm's market value will be significantly affected whenever collusive announcements are published."* The significance results are summarised in Table 7 below:

		T-stat results per event							
		Company 1	Company 2	Company 3	Company 4	Company 5	Company 6	Company 7	Company 8
Construction Sector	Event 2	Yes							
	Event 6	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	Event 7	Yes							
	Event 10	Yes							
	Event 21	Yes	Yes						
	Event 24	No							
	Event 25	Yes	Yes						
	Event 26	No	Yes	No	Yes	Yes	No	Yes	Yes
Petrochemical Sector	Event 3	Yes							
	Event 4	Yes							
	Event 8	Yes							
	Event 11	Yes							
	Event 19	Yes							
	Event 23	Yes							
F&B Sector	Event 5	No	Yes	Yes	Yes	Yes			
	Event 15	Yes							
	Event 17	No							
	Event 18	Yes							
	Event 20	Yes	Yes	Yes	Yes	Yes			
Pharma	Event 1	Yes							

Table 7: Individual statistical significance

Table 7 summarises the statistical significance across all events and all companies analysed. Of the 43 t-statistics conducted in the study, 36 (84%) were found to be statistically significant at a 5% confidence interval. The “Yes” denoted in the table implies that the results are significantly different from zero, whilst the opposite is true for “No”.

H0 can therefore not be rejected as there is significant evidence to suggest that the market value will be affected whenever collusive announcements are published.

Cross-sectional significance, however does not demonstrate a strong relationship across industry competitors.

	Event 6	Event 21	Event 25	Event 26	Event 5	Event 20
t-stat 1	No	No	No	Yes	No	Yes

Table 8: Cross-sectional statistical significance

The construction sector and the food and beverage sector were the only industries to produce events which did not produce a significantly significant result. These will be elaborated on in further detail herein.

5.1.1 The Construction Sector

Nearly 80% of the field (19 of the 24) companies analysed over the 8 construction events, tested positive for individual significance. The positive results were both significantly and practically significant in nearly all instances, only 5 of the results did not yield a significant t-test. These 5 events and results will be analysed in further detail herein:

Event 6

Event no. 6 released the initial news of the investigation into the construction cartel as well as an announcement outlining penalties to steel companies for participating in collusive practices. 7 of the 8 companies tested positive for significance, with the company Wilson Bailey Holmes Ovcon (WBHO) being the only company to not indicate any reaction to the event at a 5% confidence interval, with a t-stat reading of 0.87.

This insignificant reading can possibly be explained by the company's strong balance sheet represented and a high market cap at the time. Cross-sectional testing also reals a weak relationship between WBHO's reaction and the other industry peers. Interestingly, 5 of the 8 results also represent a positive reaction to the news which implies that the announcement may not have been fully understood or appreciated by the market. The news was seemingly discarded as being inconsequential given the positive variance.

Event 24

This event broke news of the retail property market colluding to divide the property market into two deeds of restraint, which in turn favoured the allocation of customers and territories to individual retailers. In this instance, there was no statistical significance by the market with a t-stat of -0.11 recorded. Figure 9 depicts a fairly responsive drop in the returns on the event day, but is still fairly insignificant at the 5% mark.

A possible explanation for this can be the nature of the event itself. Both the Liberty Group (Pty) Limited and Win Twice Properties (Pty) Limited compete in the retail market in the same Bedfordview area via the Eastgate Mall and Bedford Square shopping centres respectively. The investigation established that Bedford Square was restrained from concluding a lease agreement with a major anchor tenants, in violation of the act. The market could have interpreted this as an administrative error rather than a deliberate attempt to divide and disseminate territories. The penalty for the alleged collusion was also never published in the announcement and the market could therefore not have foreseen the impact to the firm's security.

Event 26

Event 26 formalises the tribunal findings and penalty reparations against the colluding construction cartel. This news comes 3 years after the initial investigation announcement made in event 6. Three of the eight firms do not show a statistically significant reaction to the announcement, with Aveng, WBHO and Raubex recording insignificant t-values. Additionally, Murray and Roberts and Group 5 also record relatively low t-statistics. These values may be statistically significant but are not practically or financially significant. With 5 of the 8 companies showing very little reaction to the news, this implies that the market either had prior warning of the bad news or had factored to reparations into the firms security ahead of the announcement.

A Noteworthy Event

Event 21 featured an announcement relating to a "fast track settlement" and reduced administrative penalty for the construction companies implicated in the 2010 soccer world cup collusion scandal. The announcement also noted that the firm, Group 5 Pty. LTD, had been assisting the competition commission since 2009 in the investigation and also noted that they had received applications for leniency received from Aveng Grinaker-LTA and Murray and Roberts.

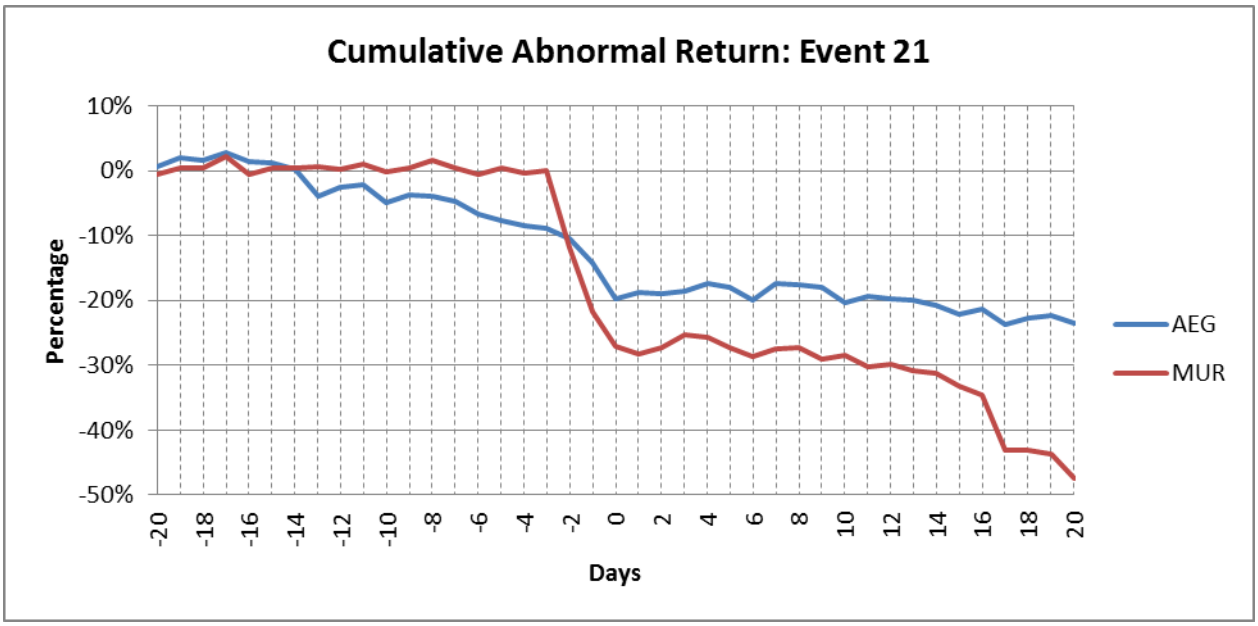


Figure 24: Event 21 CAR reaction

Figure 24 illustrates a significant loss in the share return for the companies Aveng and Murray and Roberts. There appears to be relatively insignificant volatility leading up the the announcement with a sharp decline in the returns on the day of the announcement. This negative cycle continues to depreciate in the days after the announcement, on event day 0.

This event implies that the news took the market by surprise and that the firm's value was not accurately represented by the share price. The outcome of this event relates to the research by Fombrun and Stanley (1990), in a study of 292 large U.S. firms, which found empirical evidence that public construct reputations on the basis of information about firms' relative structural positions within organizational fields, specifically using market and accounting signals indicating performance, institutional signals indicating conformity to social norms, and strategy signals indicating strategic postures (Fombrun & Shanley, 1990).

5.1.2 The Food and Beverage Sector

Event 5 and event 17 revealed statistically insignificant reactions to the announcements and will be expanded upon herein.

Event 5

The announcement launched an investigation into the supermarket industry for alleged contraventions to the Competition Act. The investigation includes major South African supermarket chains; Pick n Pay, Shoprite/Checkers, Woolworths and Spar as well as wholesaler-retailers Massmart and Metcash.

Pick n Pay were the only company to not show a significant reaction to the news with a t-stat value of 0.65, at a 5% confidence interval. The remaining 80% of the field showed significant reactions to the news.

No penalty values were published in this announcement which could possibly account for the anomaly.

Event 17

Event 17 publically announces the agreement to settle eight separate investigations undertaken by the commission to involving transgressions by Pioneer Foods against the Competitions Act.

The reaction to the news is not significant, most like due a similar announcement release 3 weeks earlier in event 15 for a similar transgression. Once again, no mention is made as to the financial reparations to be made.

5.2 General Observations

The results are fairly conclusive with 84% of the field registering statistical significance at a 5% confidence interval. The lack of significance may lie within the following discussion topics:

Leakage of Event News

Researchers interpret the abnormal return as a measure of the effect of the information received by investors. The abnormal return is therefore reflects the amount of wealth gained or lost by the event. In order to maintain the purity of the result it is therefore important that the event date to be as accurate as possible and avoid conflict with other confounding events. Depending on the

event analysed, researchers can often have difficulty identifying the actual event date as well as when the information reached the market for analysis. To counter balance this, researchers sometimes expand the event window to make sure the event date is included within a lengthened event period. This can however also lead to problems as the longer event window can create opportunity for more confounding events to be included with the date to be analysed. This in turn reduces the power of the test statistic because of the additional '*noise'* added to the event.

Leakage may well be prevalent within this study, as an enquiry into a collusive action typically takes 2 – 4 years to investigate and report findings. This falls well outside any typical event window period and makes it nearly impossible for researchers to identify when the market became aware of the information. The same can be said in instances where companies undergo a merger and/or acquisition. These deals are usually structured over a lengthy period of time and do not 'shock' the market upon announcement.

There are mathematical remedies available for researchers to handle leakage, which have not been applied to this study, however one would have to assume that leakage played a very small impact in the study give the 84% return on significance. Additional research can also be applied to this study to reassess the results of the analysis as well as the strength of the test statistic using a leakage filter. The event windows and estimation periods can also be adjusted should researchers be so inclined.

Scale of Economy

It appears that some firms with large market capitalizations seem to suffer less than smaller firms. This is possibly an indication of shareholders perception of absolute value of the consequences? The shareholder may perceive that the larger firms have the ability to rebound back from penalties whilst the opposite is true for smaller firms. Future study needed here because of the poor correlation between AR and market cap.

Investability Quotient

The Investability Quotient (IQ) is a term derived by Standard and Poor's (S&P) to define how good a firm's medium to long term investment potential is. Other considerations in the rating include the company's relative strength, liquidity, credit rating and volatility. It stands to reason that shareholders are unlikely to be perturbed by the announcement of an investigation into a sector, and more likely to take action should the firm's *'investability'* be at risk.

The majority of the announcements in the events 5,6,17, 24 and 26 only make reference to the competition commission's intention to investigate allegations of collusion against certain companies, and do not publish any financial penalties in the announcement. The announcement of 'the intention to investigate' does not appear to threaten the firms *'investability'* and hence the market remains composed. However, this cannot be said for event 26, as the announcement clearly lists the values of the penalties attached to each offending contractor.

If event 26 is treated as an anomaly, there appears that a degree of correlation exists between the announcements that publish the quantum of the penalty to the volatility of market reaction. Further research is required to determine the accuracy of this observation as well as further investigation into the value that markets place on long term investibility versus their ability to 'forgive' companies that fall foul of good corporate governance.

5.3 Discussion Pertaining to Research Question Two

H1 hypothesised that "*The valuation change to the stock price will always be negative."* Table 9, from Chapter 4, has been reproduced below:

		T-stat results per event							
		Company 1	Company 2	Company 3	Company 4	Company 5	Company 6	Company 7	Company 8
Construction Sector	Event 2	-4.6526							
	Event 6	2.6022	6.4279	0.8726	9.2044	-4.2898	-6.8392	13.9861	-4.7502
	Event 7	-11.7159							
	Event 10	11.1690							
	Event 21	-8.5557	-6.5638						
	Event 24	-0.1193							
	Event 25	-12.2800	-14.2063						
	Event 26	1.7627	-3.0651	-1.3392	-2.0751	-9.7715	1.6991	-11.5803	-9.0646
Petrochemical Sector	Event 3	-14.5697							
	Event 4	8.3417							
	Event 8	7.6830							
	Event 11	6.1108							
	Event 19	-6.8603							
	Event 23	9.8606							
F&B Sector	Event 5	0.6595	-7.2581	3.9384	-2.6247	2.8370			
	Event 15	-9.7052							
	Event 17	-1.5861							
	Event 18	7.6830							
	Event 20	-9.0666	-16.4737	-8.5408	-10.8917	-10.0407			
Pharma	Event 1	-6.9391							

Table 9: Individual statistical significance

Over 63% of the field returned a negative response to the announcements made, whilst 16 of the 44 firms analysed recorded a positive return. Over 60% of the events analysed in the construction and food and beverage sectors manufactured negative returns whilst conversely, over 80% of the events analysed in the petrochemical produced a positive outcome. Only one event was analysed in the pharmaceutical sector which was found to be negative. Further investigation into events yielding positive values is discussed herein.

5.3.1 The Construction Sector

Event 6

This event refers the release of a SENS announcement by the competition tribunal of its intention to investigate allegations of collusion in the construction sector as well as an announcement outlining penalties to steel companies for participating in collusive practice. 5 of the 8 companies interestingly indicated positive reaction to the news. A positive explanation for this may be the nature of the announcement itself as well as the macro economic conditions in the country at the time of the announcement.

The announcement merely makes mention of the tribunals *intention* to launch an investigation. *Intentions* do not necessarily always transform into penalties and is possibly not enough to scare investors away from the investment. The announcement also does not refer to any tangible penalty against the firm which is also not enough incentive for the investor to abandon the security.

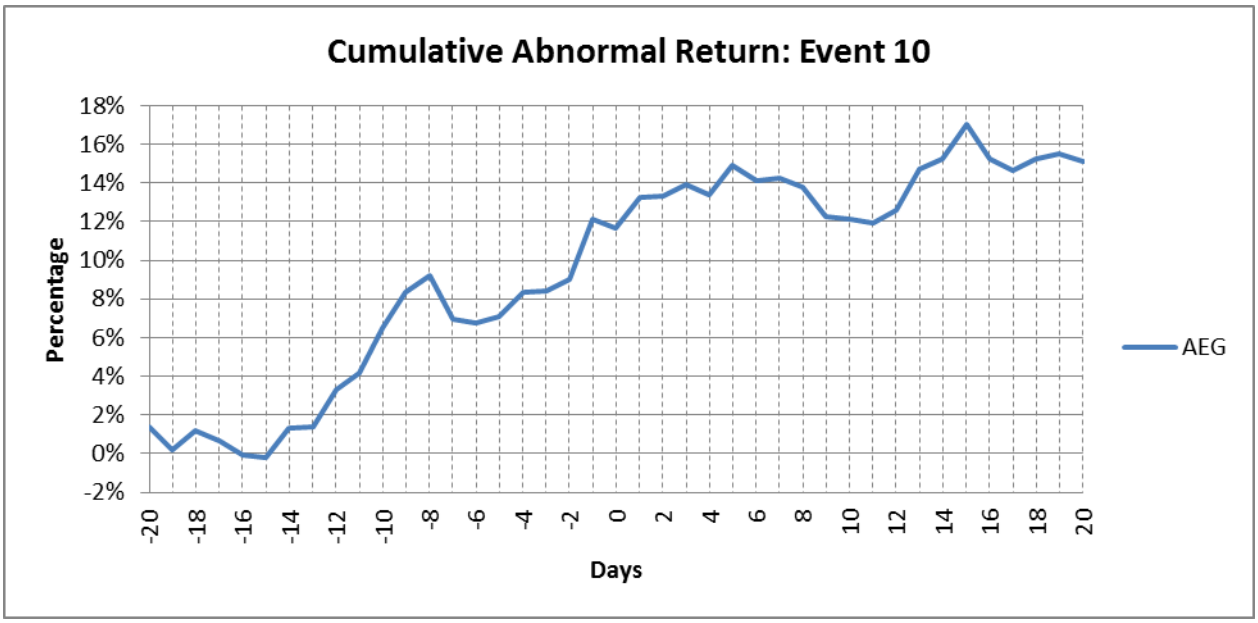
At the time of the announcement in 2009, South Africa was in the process of preparing for the 2010 soccer world cup. There was a considerable amount of investment into the country's infrastructure and the industry as a whole was fairly vibrant. Investors probably gauged that their growth in their returns would outweigh the negativity associated with the threat of an investigation into collusion.

Event 10

Event 10 formalizes the penalty valuation of Aveng's mining subsidiary, Duraset, to a value of R21.9m for colluding to fix the price of mining roof bolts. In terms of the settlement Duraset admits that it was involved in collusive agreements, arrangements and understandings with DSI (Pty) Ltd and Videx (Pty) Ltd. The penalty handed to Aveng accounts for 5% of Duraset's 2008 annual turnover. The investigation revealed that the cartel may have been started in the 1990's and was resuscitated in 2002 when DSI entered the market.

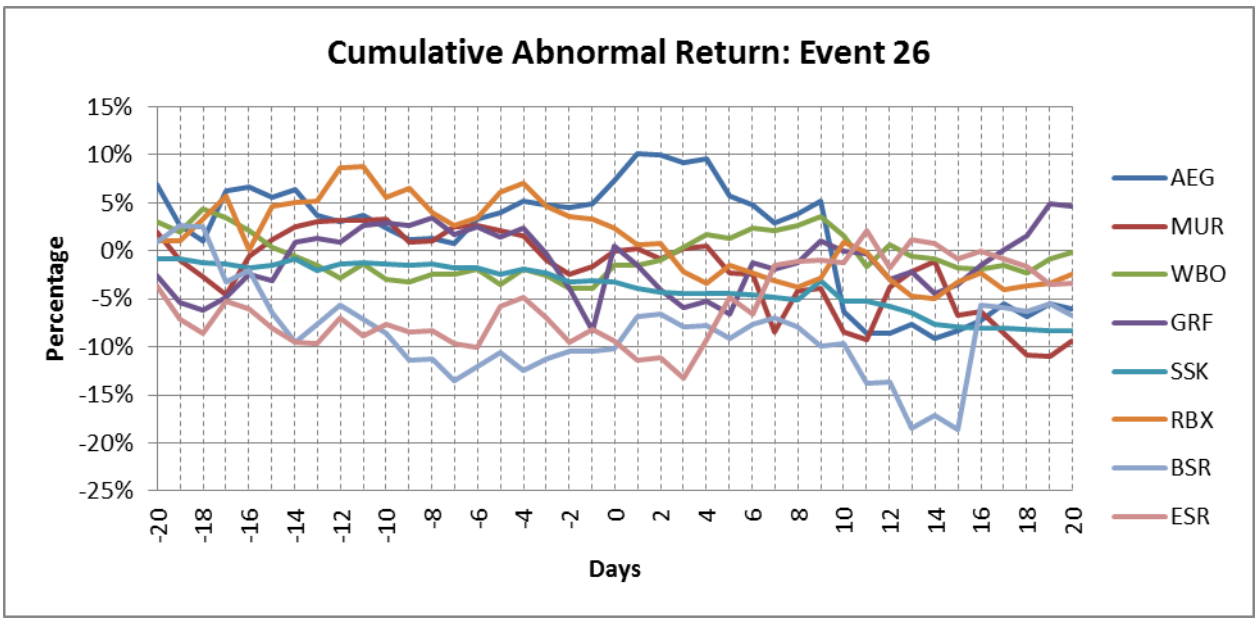
An explanation for the positive yield can possibly be explained by the length of time it took to reach a conclusion. The efficient market hypothesis relies on the market incorporating all available information and news into the stock price. Given the fact that this matter took a few years to conclude implies that the market had already factored the penalty into the firm's value. The upward trend in Figure 7, reproduced below, also attests to this theory as the market

appears to be preoccupied by other more profitable news or movements in the company balance sheet.



Event 26

This event schedules the penalties leveraged against the colluding contractors. 2 of the 8 companies analysed in this event yield a positive return. However, these positive returns are not statistically significant or practically significant. The majority of the negative reactions are both statistically and practically significant which can be seen in Figure 11, reproduced here, which shows a downward trend in abnormal return.



5.3.2 The Petrochemical Sector

Event 4, 8, 11 and 23 indicate a positive reaction to the news. This represents 80% of the field analysed, in stark contradiction to the rest of the study. Possible explanations for the contradictory reactions follow as:

- The association of the announcement to previously heard news
- The frequency of the news
- The relationship between Sasol's core oil and gas business to the peripheral industries being fined
- The volatility of the fuel price as well as macroeconomic conditions

Event no. 4 and 8 are directly associated to the initial news identified in event no. 3. Event 4 confirms Sasol's own internal investigations confirm the competition commission's findings discussed in event 3, which fully contravene the Competition Act. As a result the penalty is increased from 6% of the annual revenue to 8% of the revenue over the same period. This represents an increase from R188m to R250m. Similarly, in event 8, Sasol reach and agreement with the Competition Commission to divest 5 of its fertiliser blending facilities for the said collusion triggered in event 3.

These events are effectively spin-offs from event 3 and do not appear to deter the market from the initial bad news and pricing of the security. Interestingly, there was a significant negative reaction by the market to the news in event 3 but no subsequent reaction to similar news in the same context of event 4 and 8. This can be interpreted as the market initially holding the firm accountable for their actions, followed by a dilution of the consequence for news associated to the initial wrong doing.

The frequency of the news must also be questioned. Event no. 3 was initially aired in May 2009, whilst event 4 followed a week after the announcement and event 8 followed one month after that. One can interpret the congestion between these announcements as a contributing factor to the lack of reaction from the market.

Additionally, Sasol's core business lies within the oil and gas sector, yet most of the news associated to collusion lay within their there subsidiary businesses away from the mainstream business. This could possibly account for the lack of reaction to certain events.

The volatility in the oil price can also possibly be attributed to the market reaction. The oil price enjoyed a period of sustained growth despite the economic downturn in 2008/2009. In January

2009 a barrel of Brent crude traded at around US$42 per barrel. Yet, only two years later, prices surged to more than US$125 per barrel in early May. This upturn could possibly overshadow the negative abnormal returns associated to the collusive announcement, as the growth in the firm's primary commodity, namely oil and gas, flourished.

5.3.3 The Food and Beverage Sector

2 of the 5 events reflect some positive reactions by the market. Possible explanations for this follow as:

Event 5

3 of the 6 companies registered a positive reaction to the announcement of an investigation into the supermarket industry for alleged contraventions to the Competition Act. The outcome of the event analysis is inconclusive as 1 of these 3 positive reactions was not statistically significant, which renders a 50% split in the polarity of the market reactions. A possible explanation may lie in the nature of the announcement itself. The announcement does not impose any financial penalty but simply informs the market of an intention to investigate the supermarket industry. The announcement also identified several potential concerns ranging from the concentration of buyer power to long term exclusive lease agreements. The market is therefore unlikely to be perturbed given that no penalty has been imposed and no single company has been condemned.

Event 18

Even though this announcement is associated with collusive practice, the context of the news is actually quite positive from a corporate governance perspective. Investors would more than likely react positively to the news that Pioneer foods had been granted conditional leniency after agreeing to pay R250m to the National Revenue Fund as an administrative penalty as well as R250 to establish an Agro-processing competitive fund. This announcement is received positively by the market with a t-test of 7.083. This positive reaction is in tune with the positivity associated to the conditional leniency as well as the fact that the funds were being dispersed into vehicle that can regulate future collusive practice.

In many respects, the result of the market reaction reaffirms the markets code of good conduct, but unfortunately doesn't not hold true against the null hypothesis that the news will always be negative given a collusive announcement.

5.4 General Observations

A negative response is typically received, at 63% of the analysis, but not always negative as prescribed in the null hypothesis. This can possibly be explained by the following salient points:

Sample Size and Statistical Tests

The test statistics become unreliable if the data is not normally distributed. The statistical tests on which event studies rely are based on normality assumptions that are only dependable if the sample size is large enough. We may therefore conclude that small may account for results which are not robust.

Industry Clustering

Researchers try to identify the impact of a particular event on a firm's stock value caused by a particular event. Industry specific factors are a problem particularly if there are a large number of firms in the sample that belong to the same industry, otherwise known as clustering. This is caused by a degree of correlation amongst companies in the same industry, which can have an effect on the expected return model. When clustering occurs, conditions that may affect the industry end up affecting the companies within the cluster. To circumvent this, the researcher should be able to extract all stock price changes that are expected relative to the market. Only then will the researcher have confidence that the residual pricing will reflect the 'pure event'.

Clustering could potentially have influenced the results of this study given that the analysis was conducted on an industry specific basis. If anything the results could be skewed in favour of the null hypothesis. Further research will need to be conducted to exclude clustering bias.

5.5 Summary of Discussion

84% of the events analysed for the first research question registered a statistically significant reaction, at a 5% confidence interval. The events that produced an insignificant reaction were individually discussed and evaluated for a possible explanation. These explanations were classified and discussed in three categories, namely:

- Leakage of the news prior to the announcement
- Scale of economy
- *'Investability'* of the organisation

The second research question revealed that 63% of the results yielded a negative reaction by the market to the news of a collusive event. Although this reflects the majority of the field it does not completely satisfy the null hypothesis which states that the market reaction will always be negative upon receiving a collusive announcement.

The quality of the test statistic was brought into question as well as the size of the sample being tested as possible conclusions for the discrepancies.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

This purpose of the research study was threefold, namely, to identify the factors influencing corporate reputational damage, via a literature review. To conduct an event study on varying industries that took part in collisional practices and check for any statistical significance. And thirdly, assess if this news would always impact the market negatively given the negative association with companies that behave irresponsibly.

The chapter has been structured in such a way that the conclusions in relation to the data gathered are presented, followed by recommendations, as well as providing suggestions for further research in this field.

6.1 Conclusions of the Study

6.1.1 Does Bad News Matter?

Continuing on from the Chapter 2.6, (Davidson & Worrel, 1988) addressed the literary debate of the 1980's by firstly replacing corporate illegalities as a proxy for corporate social responsibility. Secondly, they assessed the financial performance via shareholder returns as the preferred medium of performance. They further argued that typical accounting-determined profitability measures were inadequate when measuring cross-sectional comparisons over industries and time. And lastly, they employed an event study as the chosen medium to evaluate the impact of the event against financial returns, premised upon the assumption that if the market operates efficiently it will penalize irresponsible acts.

After incorporating these amendments into the study, the results showed that the market did react negatively to the announcement of corporate illegality. Their results showed that the market does, at least in the short term, penalize the stock price of firms that are caught in socially irresponsible acts.

Similarly, this research has proven much the same, by adopting an event study as a proxy for investor response to an event. The results concluded that the market did in fact have a statistically significant reaction to the collusive announcements, and the consequent share reaction was predominantly negative.

Based on the results, one would have to conclude that bad news, and by inference poor corporate governance, does in fact matter albeit in the short term. The medium to long term effects need to be investigated further.

6.1.2 The Balance Sheet is King

One would have to conclude that investors are not easily distressed by the publication of company's collusive practice given the sedentary reaction of the market to news which did not publish the financial penalties. It appears that nature of the announcement and implications to the firm's financial position affect the volatility of the abnormal return and the magnitude of the reaction. This notion conforms to the efficient market hypothesis which concludes that the only way an investor can obtain a higher return is by purchasing riskier investments. In this context, the market has assigned very little threat to announcements that do not carry any tangible penalties and therefore do not over react to the news. The market also appears to apply a large degree of objectivity to the announcements, choosing stability in the firm's balance sheet over potential fiscal threat.

6.1.3 Transparency of the Information

The underlying assumption discussed in Chapter 3, implies that stock prices instantaneously incorporate all relevant information available to investors on the market, rendering the market efficient. An event is therefore anything that results in new information being transmitted to an investor. The event study relies on unanticipated announcements to the press. Anticipated announcements or leaked information will distort the results of the study as it is difficult to determine when traders became aware of the event news.

If the efficient market hypothesis holds true, the investment theory implies that the market continuously incorporates and reflects all available information into existing share prices. The collusive events used in this research traditionally take between 2 to 4 years to conclude. One could interpret some of the sedentary results in the study as being symptomatic of the market already incorporating much of the risk into the firm's security by the time the announcement is released. New information keeps getting infused into the market place daily which allows the investor to price new risk into the firm, which brings the transparency of the announcements into question.

However, with 84% of the study registering statistically significant reactions to the news, one would have to conclude that efficient market hypothesis has remained resolute and a study has demonstrated a significant short term reaction to the collusive news.

The assessment of the magnitude of the reaction becomes slightly more contentious. Only 63% of the study rendered a negative reaction the collusive announcements, which is slightly less convincing than the 84% majority associated to the first research question. The third underlying assumption discussed in Chapter 3 presumes that the event in question is isolated from any other rival events within the same period. For example, the announcement of the company's dividend release over the same window period would distort the abnormal return. This distortion of the event also becomes more problematic the longer the window period. The analysis conducted in the petro-chemical sector provides strong evidence that the abnormal returns may be skewed by rival events within the same period. The discussions in Chapter 5 presume that a company's core business venture may dilute the impact of the announcement on some secondary business streams, which provides a plausible explanation for lack of punitive action by the market. Overall, with a two thirds majority, the market did in fact apply punitive measures to the irresponsible company's, implying an acceptable level of transparency throughout the process.

6.2 Recommendations

This study has demonstrated that a company that engages in anti-competitive practice will, in all probability, be punished financially by their investors. The magnitude of the punishment will in all likelihood negatively affect the finance of the organisation in the short term. The medium to long term effects of this punishment are not fully understood and need to be further studied. The perception at this stage is that the incentive to commit anti-competitive practice still trumps the consequence of irresponsible behaviour. A few measures need to be put in place if the perception is to be altered.

6.2.1 Punitive Measures

Perhaps the most obvious solution to the problem is for the authorities to reconsider the magnitude of the penalties imposed on colluding organisations. As discussed in Chapter 2, reputational risk is defined as the risk arising from a negative perception across a value chain of customers, shareholders, counterparties, investors, debt holders, market analysts, regulators and other relevant parties that can adversely affect the firm's ability to maintain existing, or establish new, business relationships and continued access to sources of funding. The competition tribunal would do well to investigate imposing penalties or at least diluting the incentive to collude across the whole value chain of and not just the final perpetrator. For example, consider the implications if a regulatory penalty were to be imposed on the stock exchange in which the perpetrator operates, like the JSE, should anti-competitive practice be proven? The stock exchange would become complicit in policing anti-competitive practice as well as instituting additional regulatory frameworks to avoid the penalty. These punitive measures could be applied through the value chain to root out irresponsible behaviour.

6.2.2 Incentive

Incentives could also be used as a means to improve the general standard of corporate governance across all business streams. Tax benefits could be assigned to businesses that voluntarily enrol their employees into corporate governance training as well as submitting to frequent auditing by independent authorities. Whistle blowers could also receive further incentive other than immunity from disclosure, such as first right of refusal on selective bids.

Market transparency and early detection policies and procedures need to be re-evaluated in further detail. Collusion is more often than not a product of slow poison which has been

administered over a long period of time and not the ‘headline busts’ we have become accustomed to seeing in the news.

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APPENDIX A: TABLE 10: EVENT DATES

Event no.	Date	Ticker	Listed Info available	Industry	Company	Event Description	Fine value
1	11-Feb-08	TBS	Yes	Pharma-ceutical	Tiger Brands	Adcock Ingram and Tiger brands involved in price fixing	R110 m
2	13-Feb-09	AEG	Yes	Construction	Aveng	Aveng faces R46m fine for its findings into investigations in the Infraset Collusion. Pipes, culverts and manholes.	8 % of Infraset revenue
3	6-May-09	SAS	Yes	Petro-chemical	Sasol	Sasol settles fertiliser case with CC.	R188m
4	19-May-09	SAS	Yes	Petro-chemical	Sasol	Sasol Penalty increased due to substantiated findings.	6% to 8% meaning R188m to R250m
5	29-Jun-09	PIK SHP WHL SPP MSM	Yes Yes Yes Yes Yes No	Food and Bev	Pick n Pay Shoprite/Checkers Woolworths Spar Massmart Metcash	Press statement - CC to probe supermarket industry (Pick n Pay, Shoprite Woolworths,Spar) for contraventions of the act.	

Event no.	Date	Ticker	Listed Info available	Industry	Company	Event Description	Fine value
6	1-Sep-09	ALL	Yes	Construction	CC All construction companies	CC requests fines for steel companies and initiates construction sector investigation.	10% for steel
7	11-Nov-09	PPC	Yes No No	Construction	PPC Lafarge Afrisam	PPC confesses to being a part of a cement cartel and gets conditional leniency	
8	5-Jul-10	SAS	Yes	Petro-chemical	Sasol	Sasol to divest 5 of its fertiliser blending facilities	R250m
9	4-Aug-10		No	Petro-chemical	Foskor	Foskor admits to collusion of phosphoric acid (fertiliser component) and animal feed products	
10	10-Aug-10	AEG	Yes	Construction	Aveng	Aveng's Duraset to fined R21.9m for collusion - mining roof bolts cartel.	R21.1m
11	12-Aug-10	SAS	Yes	Petro-chemical	Sasol	Sasol and Safripol admit to contravention of the act and agree to pay a penalty It is announced that a 10% penalty is sought from Sasol	5% of annual rev from polyprop products R16,5m
12	26-Aug-10		No	Steel/ Construction	Scrap metal merchants	Notification of Scrap metal merchants to to face collusion charges The merchants face charges that they set prices, divided markets, and fixing trading conditions	

Event no.	Date	Ticker	Listed Info available	Industry	Company	Event Description	Fine value
14	1-Nov-10		No	Steel/Construction	Scrap metal merchants	Notice of settlement agreement	
15	2-Nov-10	PIO	Yes	Food and Bev	Pioneer Foods	Competition commission settles with Pioneer foods - adjusting the price of pricing flour and bread to reduce its gross margin by R160m Excluding the R195,7m settlement in Feb 2010 for their involvement in the Bread Cartel	R250m
16	3-Nov-10		No	Steel/Construction	Scrap metal merchants	Settlement agreements with scrap metal merchants Universals penalty adjusted from R15m to R18m	
17	22-Nov-10	PIO	Yes No	Food and Bev Construction	Pioneer Foods Swan Plastics	Notification of Tribunal hearing for Pioneer foods and Swan Plastics Plastic pipes cartel	
18	24-Nov-10	PIO	Yes	Food and Bev	Pioneer Food	Pioneer granted conditional leniency - predatory pricing and information sharing resulted in a administrative penalty of R250m being paid to establish an Agro-processing competitive fund.	R250m

Event no.	Date	Ticker	Listed Info available	Industry	Company	Event Description	Fine value
19	14-Dec-10	SAS	Yes	Petro-chemicals	Sasol	Sasol settles its polymers collusion case with a R111m fine Supply agreement between Sasol and Safripol Pty LTD resulted in indirect price fixing.	R111m
20	27-Jan-11	PIK SHP WHL SPP MSM	Yes Yes Yes Yes Yes No	Food and bev	Pick n Pay Shoprite/Checkers Woolworths Spar Massmart Metcash	Investigation concerns raised with 4 major supermarket retailers WRT Barriers to entry and high profit margins, Namely: 1. Exclusive lease agreements 2. Information exchange 3. Abuse of power - exclusive price 4. Category management - Product payment promotion and price	Reputational damage - Poor Public perception
21	1-Feb-11	AEG MUR	Yes Yes	Construction	Aveng Murray and Roberts	"Fast track settlement" - reduced administrative penalty. Group 5 assisting the commission from 2009 - applications for leniency received from Grinaker-LTA and Murray and Roberts (CLP).	No. of contraventions Size of bid etc.
22	7-Feb-11		No No No	Steel/Construction	SA Metal and Machinery (SAM) National Scrap Metal Power metal recycling	Scrap metal merchants to face collusion charges. Dividing the market and fix trading conditions for ferrous and nonferrous materials	10% of annual turnover

Event no.	Date	Ticker	Listed Info available	Industry	Company	Event Description	Fine value
23	28-Feb-11	SAS	Yes	Petro-chemical	Sasol Chemical Industries	Amended settlement agreement between the commission and Sasol. Sasol admit to indirect price fixing and agrees to pay a penalty. Case settled in December 2010 with Safripol	R 111 m 3% of the 2009 revenue
24	16-Mar-11	LBH	Yes No	Property Market	Liberty Group Limited Win Twice Properties	Retail property market was divided through two deeds of restraint thereby allocation customers and territories	
25	2-Apr-12	ACL	Yes No No	Steel/Construction	Acer Mittal South Africa LTD Highveld Steel Vanadium Corporation LTD	Price fixing and market allocation conduct for flat steel products	10% of annual turnover
26	22-Jul-13	AEG MUR WBO GRF SSK RBX BSR ESR	Yes Yes Yes Yes Yes Yes Yes Yes	Construction	AVENG Murray and Roberts WBHO Group 5 Steffanutti Stocks Raubex Basil Read Esor	Consent agreements reached with the Competition Commission for all construction companies.	R 306,576,143.00

Table 10: Event dates