DM

The price of dishonesty. Stock market effects of Corporate Malpractices and Misconduct: The Case of Hindenburg Research Reports

MASTER DISSERTATION

Bruno Filipe Freitas Albuquerque
MASTER IN MANAGEMENT

UNIVERSIDADE da MADEIRA
A Nossa Universidade
www.uma.pt

February | 2025

The price of dishonesty. Stock market effects of Corporate Malpractices and Misconduct:
The Case of Hindenburg Research Reports

MASTER DISSERTATION

Bruno Filipe Freitas Albuquerque
MASTER IN MANAGEMENT

SUPERVISOR
António Miguel Valente Martins

The price of dishonesty

Stock market effects of Corporate Malpractices and Misconduct: The Case of Hindenburg Research Reports

University of Madeira

Faculty of Social Sciences

Dissertation to obtain the title of Master in Management

Student no. 2051617
Bruno Albuquerque

Advisor
Professor Dr. António Martins

February 2025

ACKNOWLEDGMENT

First and foremost, I would like to express my deepest gratitude to my advisor, Professor Dr. António Martins for his exceptional academic guidance and for always being by my side. Beyond his scholarly mentorship, his support and encouragement were important throughout this journey.

I am also profoundly grateful to Professor Dr. Ricardo Gouveia, whose remarkable presence during my master's program greatly influenced my academic and personal development. His approach and personal support have left a deep impact on me.

To my family, especially to Catarina, thank you for being there through all the highs and lows. Your constant presence and encouragement have been a source of strength and motivation.

Finally, I would like to dedicate this dissertation to the memory of my grandmother Branca, who passed away at the end of last year and is mainly responsible for my education. I will never forget her.

Note on Prior Publication

I inform you that part of this dissertation was previously published as a scientific article in the journal of Finance Research Letters. The article entitled "Stock market effects of corporate malpractices and misconduct: Evidence from the short-seller Hindenburg" was submitted on August 28, 2024, and published on November 21, 2024, available through the link: https://doi.org/10.1016/j.frl.2024.106495

ABSTRACT AND KEY WORDS

This dissertation aims to understand the impact of the disclosure of corporate malpractices and misconduct actions on the market value of target listed companies. We use an event study methodology that includes 50 public announcements of corporate malpractices and misconduct practices by a forensic investigation company - the Hindenburg Research. This company is a US investment research firm focused on activist short selling, which makes money if the target company's stock prices fall as a result of a short position in the target company before the report's public release. We analyse the abnormal returns generated by public disclosures announcements of corporate malpractices and misconduct by the short-seller Hindenburg. This study offers a new perspective on the impact of this information on the financial market. Specifically, it seeks to explore whether corporate malpractices and misconduct practices have a statistically significant impact on target stock prices, and whether the type of corporate malpractices and misconduct practices and the accumulated credibility of Hindenburg Research influence the magnitude of the impact caused by the announcements. The results show that there are negative abnormal returns in firms when bad news about malpractices and misconduct are revealed by the reports. Results show a higher negative stock market reaction to the Hindenburg reports when target firms are small, have higher leverage, higher Tobin's Q, and corporate malpractice involves financial fraud. This means that the disclosure of negative or adverse information about target firms by this short seller is sometimes so negative that it seems to have a torpedo effect because of the sudden market reaction.

Keywords: Short selling; Malpractices and Misconduct, Financial Market Analysis; Event Study; Abnormal Returns.
JEL Codes: G12; G14.

INDEX

TABLE INDEX

FIGURE INDEX

1 – INTRODUCTION

In recent years, short-seller activism has emerged as a powerful force in global financial markets (Appel & Fos, 2023). Unlike traditional investors who aim to profit from rising share prices, activist short sellers take positions that benefit from price declines, after exposing alleged corporate malpractices or irregularities in publicly traded companies (Jiang *et al*., 2022). These revelations can substantially affect a company's reputation and market value, leading interested parties to reevaluate their positions (Liu *et al*., 2024), especially in a context in which ESG assumes increasingly more relevance in the long-term success of companies (Szczuka, 2015).

This dissertation aims to analyse the impact of activism short selling, with a specific focus on the public disclosures' announcements of Hindenburg Research. The study explores how the release of new negative information impacts the economic value of target companies. Corporate malpractices and misconduct in financial reporting may damage the firm's reputation with negative effects on its market value. For example, the Indian Adani Group was accused of accounting fraud and stock manipulation through opaque offshore entities, which resulted in a great decrease in the stock market value of more than $70 billion[1] (Sapra *et al*., 2024). Based on it, this study analyses the following research question: How did corporate malpractices and misconduct published in short-seller reports affect the market value of firms?

The present study differs from previous studies on the financial market impact of bad news related with malpractices and misconduct by extending the analysis of abnormal returns to the reports published by the Hindenburg short seller. Hindenburg Research is a firm specialized in forensic financial research, and although it works using fundamental analysis to aid investment decision-making, the most impactful research results from uncovering hard-to-find information from atypical sources. In general, this short seller looks for situations where companies may have any combination of accounting irregularities, bad actors in management or key service provider roles, undisclosed related-party transactions, illegal or unethical business or financial reporting practices, and undisclosed regulatory, product, or financial issues[2].

This study contributes to the literature in three important aspects. First, previous studies use databases from official entities that may sometimes already have been disseminate outdated information. To the best of our knowledge, this is the first study that analyse a set of firm reports provided by a short seller, although there are some simpler case study analyses. Second, as a

[1] edition.cnn.com/2023/01/30/investing/india-adani-rebuttal-hindenburg-allegations-intl-hnk/index.html
[2] hindenburgresearch.com/about-us/

short selling company's report is more impactful the more credibility and trust it has been recognised by the market, and financial literature allows to understand that Hindenburg's reports have been recognised as increasingly credible and impactful by the market. Because this firm has private information before the market and since they assume risk and cost on their investment, we add evidence and conclusion to the literature based on more reliable, trustful, credible, and timely reports. Third, this study allows to understand the financial impacts of corporate malpractices and misconduct related with financial and non-financial fraud, enabling investors and other stakeholders to know which practice have a higher effect.

The dissertation is organized in the following manner. Section 2 reviews the literature about corporate malpractices and misconduct, short-selling activism, and the credibility of forensic investigation reports. The research hypotheses are presented in Section 3. Section 4 presents the data and methodology employed in the empirical research. Section 5 presents and discusses the results obtained. Section 6 concludes the dissertation.

2 – LITERATURE REVIEW

2.1 – KEY CONCEPTS AND THEORIES

2.1.1 – MARKET EFFICIENCY THEORY

The event study methodology has been the standard method of measuring stock price reaction to some announcement or events since it was introduced by Fama *et al*. (1969). The literature shows that event studies have been used for two major reasons: (*i*) to test the stock market efficiency, and (*ii*) to examine the impact of some events on stock markets. The usefulness of this methodology depends on a set of assumptions that must be guaranteed so that the results do not appear biased (e.g., Brown & Warner, 1980, 1985). These authors highlight three assumptions that must be correctly taken into account in event studies: (*i*) markets are efficient - if this is true, then any financially relevant information that is newly revealed to investors will be quickly (instantaneously) incorporated into stock prices; (*ii*) events are unanticipated - the market previously did not have information on the event; (*iii*) there are no confounding effects from other events - it is possible to isolate the effects of one event from the effects of other events.

Therefore, to implement an event study it is necessary to verify the Market Efficiency Theory (Fama *et al*., 1969). In a very summary way, this theory states that share prices reflect all available information. Therefore, it should be impossible to outperform the overall market through expert stock selection or market timing. The only way an investor can obtain higher returns is by purchasing riskier investments.

2.1.2 – AGENCY THEORY

Agency theory explains the relationship between agents and principals (Jensen & Meckling, 1976). A principal relies on an agent to execute certain business or financial transactions on their behalf and to represent their interests without regard for self-interest. Principals delegate decision-making authority to agents. Financial decisions made by the agent affect the principal.

Agency theory postulates that corporate governance strategies like the board's monitoring are strongly needed to prevent individuals' opportunistic behaviours (Jensen & Meckling, 1976). Such opportunistic behaviour is the primary source of financial misconduct including

false disclosure, insider trading, price manipulation, and asset tunnelling between subsidiaries (e.g., Cumming *et al*., 2015).

2.1.3 – STAKEHOLDER AND LEGITIMACY THEORY

According to legitimacy theory, an organisation must always strive to ensure that it is regarded as operating within the constraints and norms of the society in which it functions (e.g., Phillips, 2003; Santana, 2012). Legitimacy theorists argue that to preserve its existence, a company would do whatever it takes to justify its operations. The stakeholder theory is concerned with the relationship that exists between an organisation and the many types of stakeholders that make up the organization's society (e.g., Parmar *et al*., 2010). Accountability is usually linked to stakeholder theory, which states that an organization's management is required to be accountable to its many stakeholders and to engage in activities that they feel relevant. Stakeholder theory adds resolution to legitimacy theory's "social expectations" by taking into account the organization's society, which acknowledges several stakeholders with competing interests. Legitimacy theory expands on stakeholder theory by focusing on more than simply societal expectations of responsibility. It also engages in a legitimization process, which guarantees that the organization's behaviour is regarded as conforming to societal norms and expectations from the perspective of various stakeholder groups in society. Institutional theory is concerned with widely established social norms and/or institutional practices that are impacted by the organization's stakeholders indirectly.

2.2 – SHORT-SELLING ACTIVISM

Hindenburg Research seems to be one of the most powerful voices in public activist short selling, hammering firms' share prices in recent years, mainly in firms where they can "Popping bubbles where we see them". Hindenburg appears to have a talent for targeting prominent firms with its ability to produce high-quality and influential research consistently and has been a top performer among short sellers in recent years. This short seller is not only well known for its public reports and plays a significant whistleblowing role but also has overcome SEC investigations[3]. This short-seller belongs to a new generation who launch high-profile public

[3] cnbc.com/2024/03/19/hindenburg-research-is-making-a-name-for-itself-by-taking-on-carl-ichan-gautam-adani-and-others.html. Also, Johnson *et al*. (2014) find that the consequent reputational costs about corporate fraud are large compared to the direct sanctions of the SEC and the Department of Justice.

short-selling campaigns (PSC) to drive down the shares of a target company and provide evidence of malpractice and misconduct (Liu *et al*., 2024). Short sellers are like "financial detectives, sniffing out corporate wrongdoing or inflated stock prices"[4].

Short selling consists of an investment strategy and involves selling borrowed securities with the intention of repurchasing them at a lower price in the future, profiting from the price difference, and that short sellers will only choose to short stock if they believe that the stock price will decrease enough in the future to offset the additional costs and risks (Appel & Fos, 2023; Asquith *et al*., 2005; Jiang *et al*., 2022). Whereas many management studies have documented the threat of various forms of shareholder activism, few have considered short seller activism, which according to Shi & DesJardine (2022) is a highly hostile and damaging form of activism[5]. By publicly announcing their pessimistic opinions of target firms, these activist short sellers hope to influence other market participants' views of the target stock and cause long investors to sell the stock (Liu *et al*., 2024).

The short selling strategy is a technique that can be used by speculators or to hedge risk in investment portfolios. It is important to consider that, unlike other strategies, short selling has an unlimited loss potential as it does not foresee the risk of loss associated with an exponential increase in the value of shares after being "sold short". On the other hand, in highly volatile markets it is a highly recommended practice as a complement to a diversification strategy, mitigating the risks and uncertainties associated with possible increases in prices (Asquith *et al.,* 2005; Dechow *et al*., 2001*)*.

Brendel & Ryans (2021) state that short sellers get profit after the reports are released and the stock price of the targeted companies falls. It is believed that activist short sellers will publish mostly truthful reports because an accurate track record is expected to boost the market's reaction to future reports[6]. Short sellers can't make false statements in a written research report. So, the market's response will also be influenced by the credibility of the new information and also by the firm's "credibility" before the public (Benabou & Laroque, 1992; Ljungqvist & Qian, 2016). As new reports emerge with credible information and with the result of previous statements leading to a decrease in the value of the previously targeted companies, publishing a new report will have a greater impact on the market.

[4] nytimes.com/2021/08/16/business/short-seller-wall-street-scams-hindenburg.html

[5] According to the Cambridge Dictionary, activism involves using "direct and public methods to bring about social and political changes that you and others desire". (https://dictionary.cambridge.org/dictionary/english/activism).

[6] Somaya & You (2024) explain that a particular company attempted to raise a substantial amount of capital in the market but was unable to do so due to the impact of a recent Hindenburg report, which was related to concerns about the company's strategies and future prospects. Therefore, Hindenburg reports appear to be credible and recognized by the market.

Karpoff & Lou (2010) evidence that short-sellers were highly proficient in identifying financial misconduct before it became public and could anticipate bad news. Short-seller firms share information that the market doesn't know through reports that identify weaknesses, irregularities or overvaluations that imply a decrease in the stock market value of targeted companies. Short interest seems to be a predictor of the existence of financial misconduct representation in general and often uncovers financial misconduct by corporate managers[7]. Thus, news about financial misrepresentation is linked to significant declines in stock price. Also, Marciukaityte *et al*. (2006) evidence that firms accused of fraud suffer a negative reaction from the market, resulting in sharp drops in their share prices. In this sense, Jiang *et al*. (2022) emphasize that stock prices can substantially decrease after the release of negative earnings news, which is called as "torpedo effect" and can be triggered by adverse information from short-sellers.

In general, Liu *et al*. (2024) show that short seller activity influences stock market participants' views and adversely affects the perception of key stakeholders toward target firms. When short-seller share bad news with the market which may have negative effects on the target companies, like: damage the reputation of the firm and its management (Brendel & Ryans, 2021); making it difficult for target firms to raise external capital to fund investment projects (Grullon *et al*., 2015); reputational loss damage target company credibility and future prospects with impact on higher finance (borrowing) contracting costs and more financial covenants (Deng *et al*., 2014); when related with product markets, customer reputational sanctions result in a decline in the firm's operating performance through increased selling costs, and decreased in the revenues, with impact on stock market value, which seem that that customers maybe apprehensive in dealing with a firm that has dishonest management, thus, reducing their demand for the fraud firm's products (Johnson *et al*., 2014); less target firm's new product introductions, which may be related with withdrawal of support from key stakeholders important in the product development process, like less committed employees can experience lower employee morale and the departure of key employees, leading to worse product introduction outcomes, and costumers loss with higher likelihood of customers terminating trade relationships and weaker sales growth (Liu *et al*., 2024); conjure strong negative emotions like doubt and anger against target management (Paugam *et al*., 2021).

[7] This misconduct impairs the trust between corporations, gatekeepers, and market participants that is required to engage in commerce. It also undermines capital markets' core role of efficiently allocating resources.

2.3 – ETHICS IN ORGANIZATIONAL SUSTAINABILITY

Although it is commonly believed that the market has access to all information, the reality is that reactions to introducing new relevant data are often unpredictable. Klimczak *et al.* (2022) evidence that financial misconduct is also an unethical behaviour that is difficult to overcome because the crimes of fraud committed pay off. About the ethical concerns, Michelon *et al*. (2020) explain the importance of adopting conscious and considered decisions.

Ethics are critical to the sustainability and long-term success of organizations. Sims (1992) defines the term "ethics," derived from the Greek word "ethos," as a "character or custom" that serves as a central philosophical concept for effective organizational leadership, embodying a framework of moral integrity and firm values that serve the public. The author also mentions that some organizations formally manifest this commitment by issuing codes of ethics or standards of conduct, which in some cases are put into practice, in others they end up being left unimplemented. Szczuka (2015) shows that despite ideological changes over the years, business sustainability is based on defining strategies and procedures that respond to the needs of the organization and stakeholders in the present, without forgetting the need to plan the future with awareness. CSR[8] is "a paradigmatic social construction" since it is defined around uncertain expectations of society and stakeholders, which differ depending on the context and even the sector of activity (Jackson & Apostolakou, 2010). The authors argue that it is impossible to clearly define the correct practices to adopt, however, CSR is often used as a strategic response to pressure from parties and is considered to improve the company's reputation. In the opposite direction, demonstrations of practices contrary to the interests of stakeholders lead to losses of legitimacy and credibility in the market and consequently loss of value (Jackson & Apostolakou, 2010).

The analysis of Kane (2004) demonstrates that gaps and ethical failures of the "accounting profession" due to the diversity of "loopholes in regulations" encourage the continuity of disinformation practices. Additionally, Bardos *et al*. (2020) argue for the significance of enhancing a firm's image and reputation to bolster results and, consequently, the company's value. According to Karpoff *et al*. (2008), firms engaged in fraud and financial information manipulation face significant financial and reputational repercussions that outweigh the legal consequences since potential sales losses and increased contracting and financing costs surpass legal penalties. In a study for United Kingdom, Armour *et al*. (2017) argue that the financial

[8] Corporate Social Responsibility

impact of losses surpasses legal fines and penalties by approximately nine times and emphasize that reputational damage serves as a crucial deterrent, proving more effective than legal repercussions. Despite the reduced financial impact of legal penalties, they can significantly damage the company's reputation and market value, particularly when the media's extensive coverage amplifies the effect (Amiram *et al*., 2018; Armour *et al*., 2017).

Organizations, regardless of distinctive characteristics, must consider the risk of fraud and adopt prevention and control measures (Horvat & Lipičnik, 2016). Response and internal correction actions mitigate the effect of this drop and for this reason it is important to reinforce the presence of independent audits to regain investor confidence and stabilize the company's performance in the long term (Marciukaityte *et al*., 2006). Gee *et al*. (2011) present a study that analyses the economic losses resulting from fraudulent practices and emphasize the importance of treating fraud as a business cost that, once identified, can be reduced, reinforcing the need for control mechanisms.

2.4 - "NEW" FORCES AMPLIFYING SHORT SELLING EFFECTS

With advancements in technology and communication tools, modern activists are able to reach a large audience quickly and significantly impact target companies (Ljungqvist & Qian, 2016). Kane (2004) and Laan (2009) address the disclosure of independent reports on organizations social and corporate practices, showing that signs of information incongruity can be substantially dangerous for organizations and even catastrophic in the long term.

Sun *et al*. (2021) find that firms with abnormal short selling are more likely to be revealed to the public and that the market reacts significantly negatively to the frauds exposed by the media. Since corporations have strong incentives to limit the disclosure of information about misconduct, Carberry *et al*. (2018) show that when the media provides clear and credible information that misconduct occurred, that the firm was responsible, and that the misconduct stemmed from deeper organizational issues, investors are more likely to react negatively. Hindenburg reports are even more used by media to share news into the market, which encourage the increasing of its effects on the market over the time.

2.5 - SHORT SELLERS: HEROES OR VILLAINS OF THE FINANCIAL MARKET?

Financial literature discusses the role of short sellers in the financial market. Since there may be a high level of generalized corporate fraud (Dyck *et al*., 2024), short selling can help to diminish and reduce the incentives to commit such crimes and help to detect fraud, and improve price efficiency (Fang *et al*., 2016). Although short sellers are uninformed and predatory traders who play a detrimental role in society by manipulating stock prices, inducing market volatility, generating unwanted selling pressure, and limiting market efficiency (Brunnermeier & Oehmke, 2013; Goldstein & Guembel, 2008; Ljungqvist & Qian, 2016), some authors show a positive role for short sellers in price discovery and stock market efficiency and disciplining corporate managers, because they collect information from a variety of public and private information sources (Boehmer *et al*., 2008; Christophe *et al*., 2010; Diether *et al*., 2009). Since short selling may enhance information efficiency (Feng *et al*., 2017) and improve price efficiency (Gao & Ding, 2019), short selling can help prevent corporate misconduct and fraud (Fang *et al*., 2016, Karpoff & Lou, 2010, Meng *et al*., 2023) and facilitates the identification of corporate financial fraud (Cao *et al*., 2023, Chang *et al*., 2019). Short sellers explore negative news, such as financial misrepresentation and fraud, to the public (Karpoff & Lou, 2010) and impact stock prices to reflect unfavourable information more quickly (Guan *et al*., 2022; Li & Zhang, 2015).

Jiang *et al*. (2022) highlight that short sellers have access not only to public information in which they have superior capability in processing publicly available information accurately and efficiently, but also private information in which its information advantage may derive from their acquisition of private information that is not accessible to all the market participants (Christophe *et al*., 2010). Some studies have shown that short sellers have an informational advantage in identifying and shorting stocks of firms that experience subsequent public revelation of financial misconduct, accounting restatement announcements, bond rating downgrades, credit rating downgrades, financial analysts' stock downgrades, large insider sales, private placements, and asset write-downs.

Amiram *et al.* (2018) explain the financial reporting fraud and other forms of misconduct, and Liu *et al*. (2024) define malpractice and misconduct in six categories: product-related issues; business or management issues; accounting or disclosure issues; financing issues; legal or fraud issues; no specific issue. However, also nonfinancial misconduct may be relevant for short-sellers and are bad news for financial markets, where the excessive pollutant emissions from Volkswagen cars (Marino *et al*., 2024), corporate regulatory violations, lawsuits, and

regulatory enforcement actions in American pharmaceutical industry (Unsal & Hippler, 2024), disasters related to fraudulent safety procedures in Boeing 737 Max aircrafts (Collings *et al*., 2022) and technical failures in BP's operational activity and inability to contain or control the subsequent Gulf oil spill (Humphrey *et al.*, 2016) are excellent examples, although it seems that in these cases firms seems to have better accounting and financial practices (Yang & Liu, 2024).

Similar to what mentioned previously in relation to the Indian Adani Group, the Swiss fintech Temenos[9] decreased nearly $3.4bn (about 28%) from its market value after activist investors announcement of the manipulation related to major accounting irregularities, which "includes evidence of round-tripped revenue, sham partnerships, rampant pulling forward of contract renewals, backdated contracts, excessive capitalization of seemingly non-existent R&D investments, and other classic accounting red flags". The Nigerian Tingo[10] also dropped about 60% on the day of the announcement of doubts related to the number of users, not having the mobile license required to operate the business, inactive websites, and a seemingly non-existent food processing site. US Renovaro Bioscience[11] faced negative effects related to the management of faked clinical data related to therapies for HBV and COVID-19 and also because the firm decided to merge with another firm, which was later exposed as having no operational history, no product, and virtually no assets. Also, Polish fashion retailer LPP[12] dropped nearly 30% after publicizing that the firm was making money in Russia despite promising to end operations there following the invasion of Ukraine in 2022.

All of this bad news from corporate wrongdoings, based on the Hindenburg Research short-seller reports, not only highlights the ability of short sellers to identify and expose uncovered practices, but also highlights how the disclosure of financial and non-financial misconduct can significantly impact the market value and confidence of target companies. These cases reinforce the crucial role that short sellers play in promoting corporate transparency and accountability, influencing corporate behaviour, and contributing to the efficiency of financial markets.

[9] ft.com/content/2430ad96-993a-40e5-8eee-37330ff6d3aa
[10] ft.com/content/228fac01-1e93-4162-8f14-dcac297a44ad
[11] sahmcapital.com/news/content/renovaro-biosciences-faces-turmoil-after-hindenburg-report-accusing-questionable-merger-and-governance-stock-crashes-2024-02-13
[12] reuters.com/business/retail-consumer/polish-fashion-group-lpps-shares-tumble-after-hindenburg-report-2024-03-15/

3 – RESEARCH HYPOTHESES

The disclosure of important unknown information into the market about corporate malpractices and misconduct practices can influence the market value of target companies. Previous empirical studies, as is the case of Kane (2004) and Laan (2009), show that announcements may have a negative and statistically impact on the company's market value. We, therefore, formulate our first research hypothesis as follows:

[H1] The publication of forensic investigation reports that indicate questionable practices, financial problems, allegations of fraud, share manipulation, overvaluation, potentially erroneous investments, and accounting fraud, has a negative and significant impact on the market value of the targeted companies.

Additionally, we analyse the impact of the type of corporate malpractices and misconduct practices (financial fraud vs non-financial fraud) and the impact of accumulated credibility of Hindenburg Research on target companies. According to Amiram *et al*. (2018), Liu *et al*. (2024) and Yang & Liu (2024), the magnitude of the impact is higher for financial fraud disclosures. Therefore, our second research hypothesis is the following:

[H2] The publication of forensic investigation reports that indicate financial fraud has a higher significant negative impact on the value of the targeted company than in the case of non-financial fraud.

Finally, as suggested by Benabou & Laroque (1992), Brendel & Ryans (2021) and Ljungqvist & Qian (2016), we also investigate the impact of the credibility of the author of the report. Generally, the reports presented by forensic investigation companies are truthful, and its consistency is expected to increase the response and profit obtained by short selling in future transactions. In this sense, the research company's history and previous results promote the company's credibility and, consequently, increase the negative impact of their announcements on the abnormal returns of the targeted companies. Our last research hypothesis is the following:

[H3] Abnormal returns of targeted companies are more negative and statistically significant when the forensic research reports have greater accumulated credibility over time.

4 – DATA AND METHODOLOGY

The methodology employed in this study is quantitative and is particularly suitable for the analysis of financial impacts and market reactions to corporate misconduct. The event study methodology was chosen because it allows evaluating the effect that new information has on share prices. This method provides a robust and objective way to quantify abnormal returns, offering statistical tests to measure the magnitude and significance of abnormal returns. As explained by Brown & Warner (1985) and MacKinlay (1997), event studies are effective in capturing the immediate market response to new information, making them appropriate for this type of analysis.

This research uses adjusted daily observations of 50 stock market firms with a Hindenburg report and uses the date on which the report is disclosed to the market as the event date to calculate abnormal returns (ARs). Companies differ in terms of location, size, and sector of activity. The geographic distribution of the "headquarters" of these companies is illustrated in figure 4.1. The sample distribution of target companies by country is the following: 40 firms are located in the US, 7 in India, 1 in Canada, 1 in China and 1 in Russia.

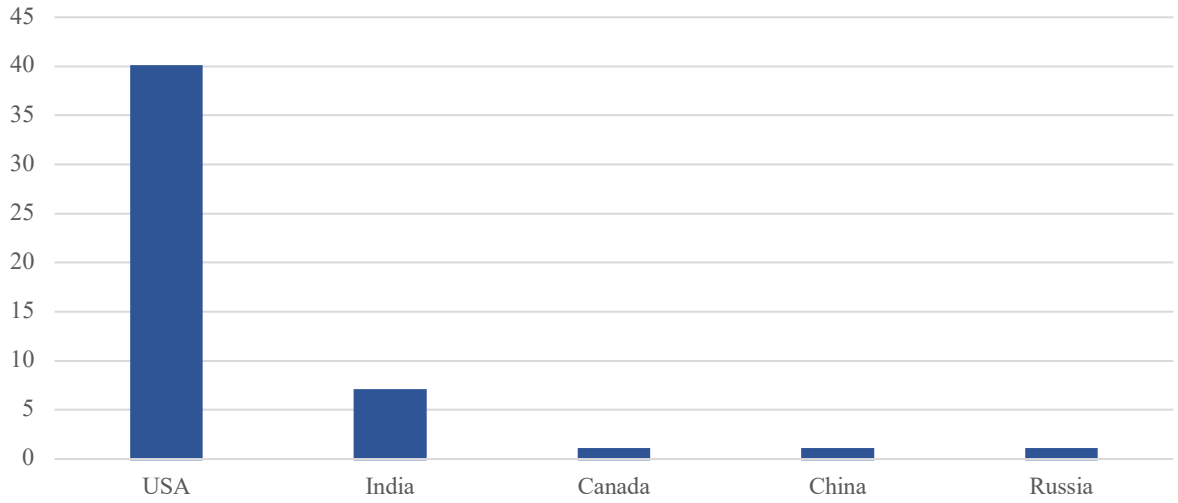

Figure 4.1 - Distribution of headquarters by country[13]

To maximize forecast accuracy as much as possible, we have chosen a forecast period of 140 days before the event date. Firm's stock returns were obtained from Yahoo Finance website (https://finance.yahoo.com/). Data extraction was achieved by creating programming codes using Python. Then, using Excel spreadsheets, we calculated the abnormal returns and implemented the significance tests, based on information collected in Serra (2004).

[13] This figure plots the distribution by headquarters of the sample used. The United States represents the majority, reflecting the geographic focus of Hindenburg Research's reports.

The market return benchmark calculated using the natural logarithm of returns for each target firms ($R_{it} = ln\ \frac{P_{i,t}}{P_{i,t-1}}$).

We use the standard abnormal returns technique based on the market model (MM), the Fama and French three-factor model (FF3) (Fama & French, 1992) and the Fama and French five-factor model (FF5) (Fama & French, 2015) to measure the magnitude of stock price reaction to the Hindenburg report disclosure[14]. We calculate the normal rate of return as follows:

$$E(R_{it}) = a_i + b_i R_{mt} + e_{it} \quad (1)$$

where, $E(R_{it})$ is the expected rate of return of stock market firm i on the trading day t; R_{mt} is the benchmark index; a_i and b_i are the regression coefficients of the daily rate of return of stock market firms i and the market rate of return, respectively. e_{it} is the error term.

The FF3 are measured as the residual returns from estimating the following regression equation:

$$R_{it} - R_{f,t} = a_{it} + \beta_1\left[R_{m,t} - R_{f,t}\right] + \beta_2 \mathrm{SMB}_t + \beta_3 \mathrm{HML}_t + \varepsilon_{i,t} \quad (2)$$

where, R_{ft} is the risk-free rate of return at time t; R_{mt} is the benchmark index; *SMB* is the small minus large market capitalization risk factor, *HML* is the high book-to-value minus low-book-to-value risk factor. The Fama-French factors *SMB*, *HML* and the risk-free rate return are obtained from the homepage of Kenneth French at Dartmouth College[15].

The FF5 are measured as the residual returns from estimating the following regression equation:

$$R_{it} - R_{f,t} = a_{it} + \beta_1\left[R_{m,t} - R_{f,t}\right] + \beta_2 \mathrm{SMB}_t + \beta_3 \mathrm{HML}_t + \beta_4 \mathrm{RMW}_t + \beta_5 \mathrm{CMA}_t + \varepsilon_{i,t} \quad (3)$$

where, R_{ft} is the risk-free rate of return at time t; R_{mt} is the benchmark index; *SMB* is the small minus large market capitalization risk factor, *HML* is the high book-to-value minus low-book-to-value risk factor. The Fama-French factors *SMB*, *HML*, *RMW*, *CMA* and the risk-free rate return are obtained from the homepage of Kenneth French at Dartmouth College[16].

[14] For more details, please see MacKinlay (1997).
[15] mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
[16] mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

We use the date of report disclosure (day *t=0*) as the event date to calculate abnormal returns (ARs), which are obtained by the difference between observed returns of stock market firm *i* on day *t* and the expected return generated by the MM, as follows:

$$AR_{it} = R_{it} - E(R_{it}) \quad (4)$$

Daily returns are collected for the period (t=-140 to 10). The estimation and event periods were defined respectively as [-140, -21] and [-10, 10]. Identical estimation and event windows were adopted by Martins *et al*. (2023). The benchmark index used to calculate the abnormal returns was the total return of stock market indexes. By cumulating the ARs over a particular time interval, we obtain the cumulative abnormal returns (CARs) as follows:

$$CAR[t_1, t_2] = \sum_{t_1}^{t_2} AR_t \quad (5)$$

We use six different time intervals (event windows) to calculate the CARs: [-1,+1], [-1,+5], [-1,+10], [-5,+5], [-5,+10] and [-10,+10] – event day and post-event windows. We perform parametric (Patell t-test) and non-parametric tests (Corrado test) to measure the statistical significance of CARs. Serra (2004) explains in more detail these tests. We use Ordinary Least Squares (OLS) to analyse how firm-specific characteristics impact the variation of abnormal returns across different firms, following the specified model:

$$CAR_i = \beta_0 + \beta_1 \ln(SIZE_i) + \beta_2 LEV_i + \beta_3 ROA_i + \beta_4 INST_i + \beta_5 TOBIN's\ Q_i + \beta_6 FRAUD_i + \varepsilon_i \quad (6)$$

where, CAR_i is the cumulative abnormal returns calculated using the Fama and French three-factor model for firm's Hindenburg report *i* for event window *w*. Table 4.1 presents the control variables used in the cross-sectional analysis. These variables were chosen since target firms seem to be smaller (*SIZE*), have lower leverage (*LEV*), lower profitability (*ROA*) and higher Tobin's Q (*TOBIN*) (Brendel & Ryans, 2021). The disclosure of bad news affects more quickly and negatively target firms with institutional investors (*INST*) (Gao & Ding, 2019), and they often respond to short-selling by delaying transactions (Di Maggio *et al*., 2019). Regarding *FRAUD* variable, although we found no studies distinguishing its effects, based on nonfinancial wrongdoing studies (e.g., Marino *et al*., 2024; Unsal & Hippler, 2024), we expect a negative CAR reaction to both types of misconduct but of higher magnitude for financial compared to nonfinancial misconduct (Liu *et al*., 2024; Yang & Liu, 2024).

Table 4.1 - Determinants of Cumulative Abnormal Returns (CARs): Variable Definition and Expected Relationship

Variable	Measure	Author(s)	Exp. Effect
Size (SIZE)	Market capitalization in USD (natural logarithm)	Brav *et al*. (2008)	+/-
Leverage (LEV)	Ratio of total liabilities to total assets (%)	Brav *et al*. (2008)	-
Profitability (ROA)	Ratio of operating income to total average assets (%)	Sun & Xu (2024)	-
Institutional Ownership (INST)	Percentage of stock that are owned by institutional investors	Gao & Dong (2019)	+
Tobin's Q	Ratio of market value to total average assets (%)	Sun & Xu (2024)	-
Financial Fraud Dummy (FRAUD)	Dummy variable that takes the value of one if the firm malpractice is due to the practice of financial fraud in firm i, and 0 otherwise (i.e., malpractice is due to the practice of other reasons of fraud, non-financial fraud)	Liu *et al*. (2024)	-

This table presents the definitions, notation, and the expected effect of explanatory variables of Equation 4 on CARs (target firms). Accounting data are from the year prior to the firm's Hindenburg report disclosure, obtained from Yahoo Finance website. The FRAUD variable was built based on information collected on the Hindenburg website.

This empirical research adopts an objectivist ontological perspective and a positivist epistemological stance. Ontologically, it is assumed that social realities, such as the characteristics of short sales and the implications in the financial market, exist independently of social actors and can be considered objective and external entities (Bryman, 2008; Saunders *et al*., 2007). Epistemologically, the study takes a positivist stance, applying methods and techniques from natural sciences to investigate and understand the impact of reports published by Hindenburg on the abnormal returns of target companies (Bryman, 2008). This approach allows collecting and analysing quantitative data to obtain objective and verifiable knowledge, aligning with the objective of identifying patterns and causal relationships in the studied context.

5 – RESULTS

5.1 - ABNORMAL RETURN

Figure 5.1 plots the CARs calculated according to the Market Model (MM) during the event period, indicating a negative stock price reaction around the firm's report disclosure events.

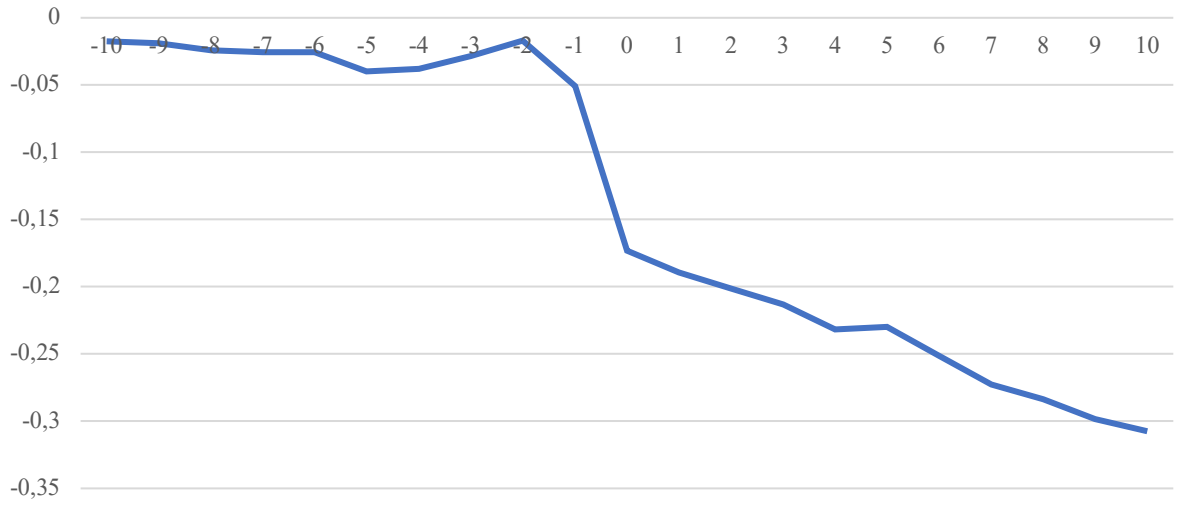

Figure 5.1.1 - MM CARs Around the Hindenburg Reports

Figures 5.2 and 5.3 plots the CARs calculated according to the Fama and French three-factor model (FF3) and five-factor model (FF5), respectively, for the event window, indicating a negative stock price reaction around the firm's report disclosure events. All the three figures suggest that the market views these events as harmful.

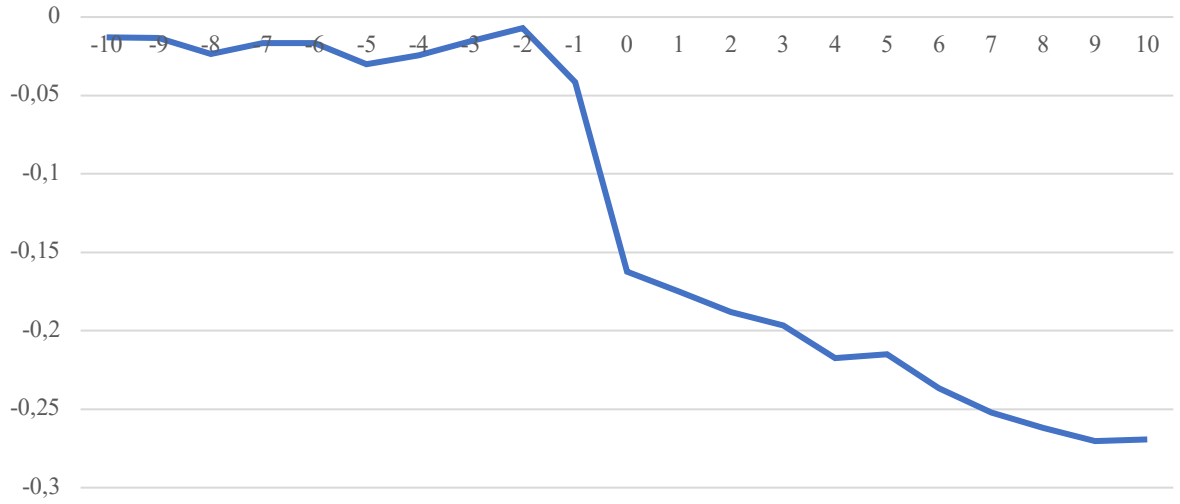

Figure 5.1.2 - FF3 CARs Around the Hindenburg Reports

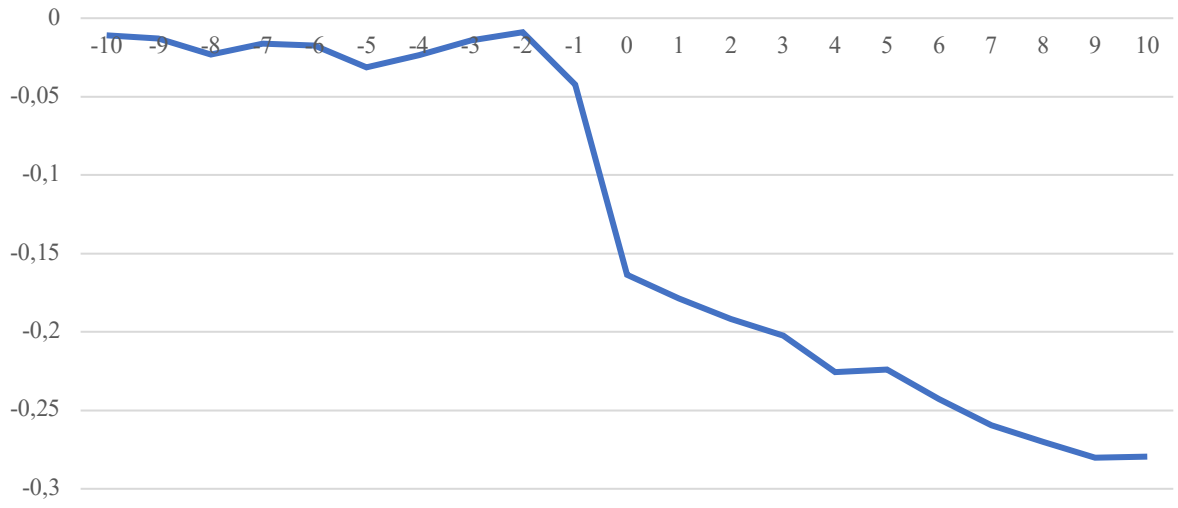

Figure 5.1.3 - FF5 CARs Around the Hindenburg Reports

Table 5.1 shows the CARs for targeted firms based on the Hindenburg report around the disclosure dates. The results evidence a negative and statistically significant stock price reaction to the reports for the six-time intervals. The table present CARs of -20.11%, - 24.96%, -32.59%, -25.64%, -33.27% and -36.50% (MM), -16.77%, -20.79%, - 26.20%, -19.85%, -25.26% and -26.91% (FF3) and -16.96%, -21.49%, -20.63%, -25.26% and -27.94% (FF5) for the time window [-1;1], [-1;5], [-1;10], [-5;5], [-5;10], [-10;10], respectively. The parametric and non-parametric tests show a statistical significance of 1% for all intervals. These values are much higher than those found in other empirical studies, which can be attributed to our sample belonging to a single short-seller with high-profile public short-selling campaign, recognised for its credibility by the market and media. Karajian & Ullah (2022) found a CAR of - 13.43% during the three-day window, and Liu *et al*. (2024) found a CAR of -4.03% during the [0;+5] time window. The results show that the negative effect of disclosure reports persists over time, and evidence the market seriously considers the new adverse information credibly. Therefore, disclosing wrongdoing reports due to significant financial, reputational, and legal damage, leading to decreased revenues, customer relations, access to capital, and higher borrowing costs, negatively impacting future cash flow. Following the release of the Hindenburg report, the target firm's share prices experienced sharp, immediate, and persistent declines, indicating that the market heavily penalizes these stocks. This also suggests that investors trust the negative information presented by the short seller.

Table 5.1.1 - Descriptive Statistics of CARs, Variables and Abnormal Returns Tests

Variable		Mean	SD	25th perc.	Median	75th perc.	θ_1	τ_1
Panel 1: All Sample								
CAR [-1,1]	MM	-20.117%	25.412%	-34.015%	-14.660%	-6.181%	-12.68***	-3.911***
	FF3	-16.773%	22.263%	-24.238%	-13.399%	-7.618%	-8.607***	-3.506***
	FF5	-16.967%	21.991%	-26.066%	-13.632%	-8.643%	-8.621***	-3.496***
CAR [-1,5]	MM	-24.960%	34.079%	-44.893%	-24.321%	-5.130%	-10.30***	-2.676***
	FF3	-20.794%	31.236%	-39.498%	-23.808%	-5.112%	-6.985***	-2.672***
	FF5	-21.486%	31.258%	-39.804%	-22.948%	-7.060%	-7.146***	-2.706***
CAR [-1,10]	MM	-32.589%	39.934%	-55.212%	-31.014%	-7.452%	-10.27***	-2.841***
	FF3	-26.201%	36.950%	-48.466%	-29.133%	-7.227%	-6.723***	-2.696***
	FF5	-27.041%	37.302%	-50.996%	-31.925%	-6.652%	-6.869***	-2.521***
CAR [-5,5]	MM	-25.639%	37.373%	-46.451%	-23.528%	-3.655%	-8.440***	-2.964***
	FF3	-19.848%	38.024%	-39.420%	-15.483%	-5.907%	-5.319***	-3.088***
	FF5	-20.627%	38.157%	-43.953%	-15.198%	-6.339%	-5.473***	-3.085***
CAR [-5,10]	MM	-33.268%	40.263%	-58.386%	-27.173%	-5.942%	-9.081***	-3.161***
	FF3	-25.255%	38.593%	-45.600%	-24.616%	-7.844%	-5.612***	-2.954***
	FF5	-26.182%	38.876%	-48.761%	-26.058%	-5.666%	-5.760***	-2.951***
CAR [-10,10]	MM	-36.501%	46.728%	-62.374%	-27.971%	0.555%	-8.697***	-2.673***
	FF3	-26.907%	46.042%	-58.194%	-23.788%	-3.800%	-5.219***	-2.419***
	FF5	-27.935%	46.571%	-58.666%	-29.081%	1.521%	-5.364***	-2.365***

Panel 2: Control Variables – All Sample					
SIZE	$63,650 k	$20,786 k	$11,143 k	$27,792 k	$47,164 k
LEV	58.9%	44.4%	21.8%	45.6%	72.8%
ROA	1.3%	36.1%	-2.7%	0.0%	3.6%
INST	21.7%	22.2%	2.15%	9.1%	35.5%
Tobin's Q	54.3%	19.3%	39.0%	57.9%	66.6%
FRAUD	50.0%	50.0%	0	0.5	1

This table presents the descriptive statistics of CARs and results of abnormal returns tests (Panel 1) and descriptive statistics of CARs and control variables (Panel 2). The CARs for target firms were calculated using MM, FF3 and FF5. All figures of firm-specific control variables in Panel 2 are calculated from the previous year-end accounting figures. *SIZEi* is the market capitalization in USD (natural logarithm) for firm i; *LEVi* is the ratio of debt to total assets (%) for firm i; *ROAi* is the ratio of operating income to total average assets (%) for firm i; *INSTi* is

the percentage of stock that are in possession of institutional investors (%) for firm i; Tobin's Qi is the ratio of market value to total average assets (%) for firm i; *FRAUDi* is a dummy variable that takes the value 1 if the corporate malpractice is due to the practice of financial fraud in firm i, and 0 otherwise. θ1 and τ1 are the t-test statistics and Corrado rank test statistics, respectively of Brown & Warner (1980) and Corrado (1989) (see Serra, 2004, for more details). *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Regarding the market reaction to the credibility of Hindenburg reports[17], Panel 1 from Table 5.2 shows a lack of statistically significant abnormal returns for older reports subsample. Regarding recent reports subsample, the CARs are negative and statistically significant. For the event window [-10;+10], we observe a CAAR of -47.06% (MM), -49.51% (FF3) and -51.37% (FF5) for the quartile of most recent reports. The results of two-sample z-test for difference of means show a larger negative abnormal return for recent firm reports. These results may be explained by the increasingly trustful and credible new information from the Hindenburg reports over time, leading to an improved reputation as short seller (e.g., Paugam *et al*., 2021). The market's reaction to bad news in recent reports seems more negative than on the older reports, suggesting an improvement in the short-seller track record and greater market recognition. These results can also be observed through the figure 5.4.

Panel 2 from Table 5.2 evidence the market reaction to different types of malpractice. Although all types evidence significant negative CAARs, we show that financial fraud reports have a greater negative effect compared to other reasons of fraud (e.g., -43.76% (MM) and -38.38% (FF3) and -15.64% (FF5) vs -28.64% (MM), -14.48% (FF3) and -39.28% (FF5) for [-10;+10] time window). However, on the shorter window period [-1;+1] the negative CAARs for other reasons of fraud surplus the one of financial fraud. So, both financial and non-financial frauds have negative stock price effects on the target firms. We also compute the two-sample z-test for difference of means, that show higher negative abnormal returns for financial fraud reports, except on the shorter time-window where the negative effect on CAAR is not statistically different. This pattern of market price behaviour is in accordance with the financial literature (e.g., Yang & Liu, 2024; Liu *et al*., 2024). These results can also be observed through the figure 5.5.

[17] Based on the more recent examples, "Hindenburg Research has demonstrated comprehensive investigative skills and has had a solid track record so far", that is explained in www.cmcmarkets.com/en/news-and-analysis/who-is-hindenburg-research-forensic, as requested by Ljungqvist & Qian (2016).

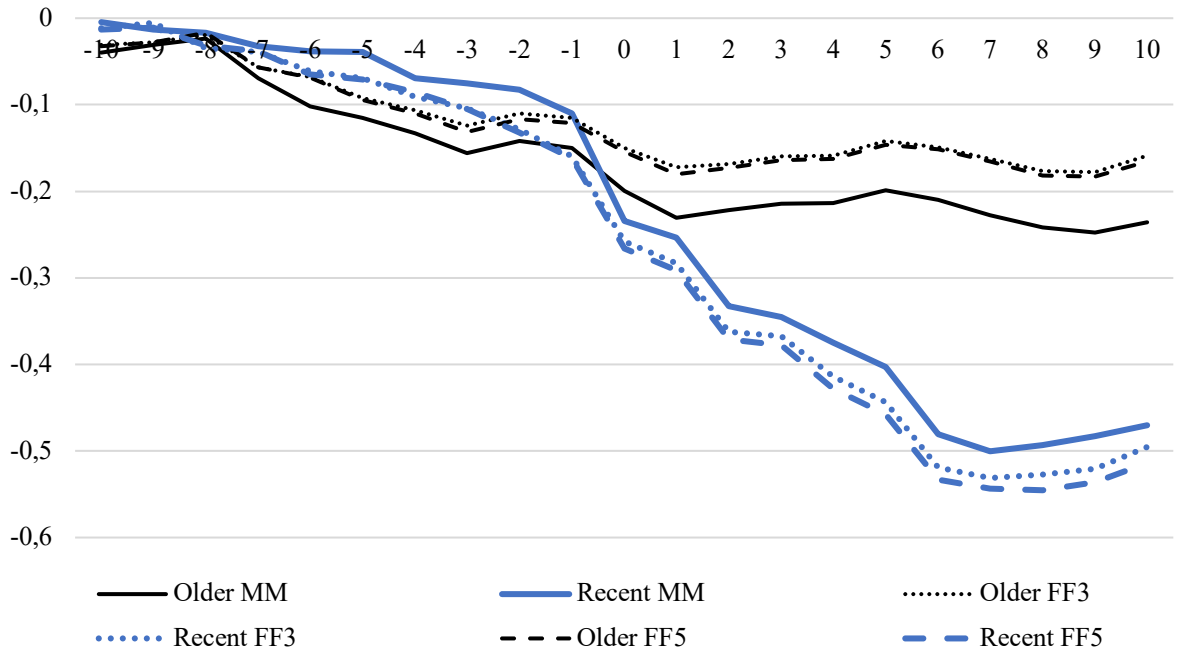

Figure 5.1.4 - Older and Recent subsamples

This figure represents the MM, FF3 and FF5 CARs during the event period for the "Older" and "Recent" subsamples. The analysis of this graph is completed by reading table 5.2.

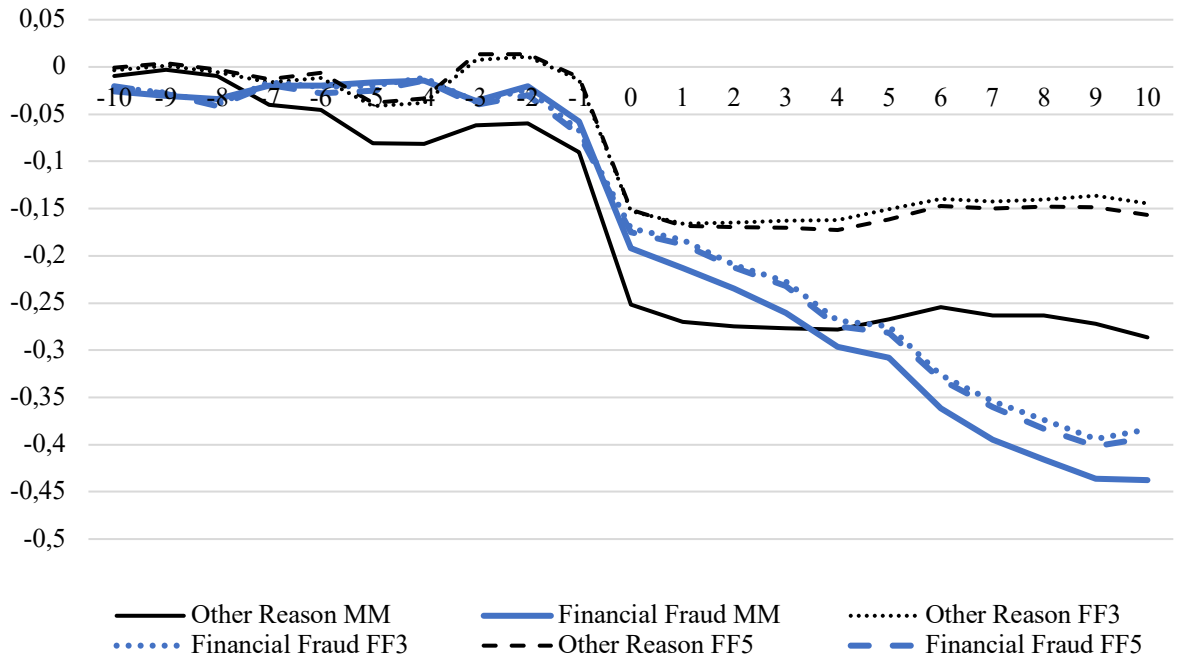

Figure 5.1.5 - Financial Fraud and Other Reason

This figure represents the MM, FF3 and FF5 CARs during the event period for the "Financial Fraud" and "Other Reason" subsamples. The analysis of this graph is completed by reading table 5.2.

Table 5.1.2 - Firm's CAARs by Report Age, Type of Corporate Malpractice and Difference Test for CAARs

Panel 1: Older vs Recent subsamples

		Older subsample			Recent subsample			Difference	
#Firms		12			13				
		CAAR	$\theta 1$	$\tau 1$	CAAR	$\theta 1$	$\tau 1$	CAAR	*z*-test *(p-value)*
[-1; +1]	**MM**	-8.923%	-1.652	-0.823	-17.086%	-8.894***	-3.121***	-8.163%	0.24
	FF3	-6.217%	-1.393	-0.714	-15.457%	-4.325***	-2.878***	-9.240%	0.18
	FF5	-6.339%	-1.424	-0.662	-15.94%	-4.742***	-0.881	-9.605%	0.17
[-5; +5]	**MM**	-9.695%	-1.391	-0.571	-36.461%	-9.912***	-3.146***	-26.76%	0.044**
	FF3	-7.397%	-0.865	-0.623	-38.247%	-5.589***	-3.041***	-30.85%	0.017**
	FF5	-7.775%	-0.912	-0.612	-39.272%	-6.100***	-1.065	-31.50%	0.016**
[-5; +10]	**MM**	-13.39%	-1.594	-0.597	-43.201%	-9.738***	-3.129***	-29.80%	0.040**
	FF3	-9.102%	-0.883	-0.490	-43.358%	-5.253***	-2.979***	-34.26%	0.011**
	FF5	-9.660%	-0.940	-0.481	-44.887%	-5.781***	-1.006***	-35.28%	0.011**
[-10; +10]	**MM**	-23.57%	-1.640	-0.475	-47.057%	-9.259***	-2.995***	-23.49%	0.019**
	FF3	-15.89%	-1.344	-0.311	-49.509%	-5.236***	-2.875***	-33.64%	0.021**
	FF5	-16.53%	-1.403	-0.253	-51.366%	-5.774***	-0.900***	-34.84%	0.020**

Panel 2: Type of Corporate Malpractice

		Financial Fraud			Other Reason			Difference	
#Firms		26			24				
		CAAR	$\theta 1$	$\tau 1$	CAAR	$\theta 1$	$\tau 1$	CAAR	*z*-test *(p-value)*
[-1; +1]	**MM**	-19.26%	-7.78***	-3.33***	-21.05%	-10.85***	-3.15***	1.783%	0.401
	FF3	-15.94%	-5.03***	-3.14***	-17.68%	-8.55***	-2.97***	1.747%	0.389
	FF5	-15.86%	-4.99***	-2.11***	-18.17%	-8.56***	-1.92*	2.312%	0.353
[-5; +5]	**MM**	-28.83%	-6.09***	-2.91***	-22.18%	-5.972***	-2.477**	-6.65%	0.401
	FF3	-25.32%	-4.17***	-3.09***	-13.92%	-3.515***	2.491**	-11.4%	0.141
	FF5	-25.35%	-4.16***	-2.039**	-15.51%	-3.82***	-1.39	-9.83%	0.178
[-5; +10]	**MM**	-41.17%	-7.31***	-3.37***	-24.06%	-5.371***	-2.21***	-17.7%	0,020**
	FF3	-36.25%	-4.95***	-2.319**	-13.34%	-2.794***	-2.052**	-22.9%	0.013**
	FF5	-36.50%	-4.07***	-2.289**	-15.00%	-3.06***	-1.04	-21.5%	0.019**
[-10; +10]	**MM**	-43.76%	-6.69***	-3.08***	-28.63%	-5.580***	-2.171**	-15.1%	0.039**
	FF3	-38.37%	-4.57***	-3.06***	-14.48%	-2.748***	-2.066**	-23.9%	0,028**
	FF5	-39.28%	-4.67***	-2.040**	-15.64%	-2.78**	-0.60	-23.6%	0.030**

This table presents the firm's cumulative average abnormal returns (CAARs) to Hindenburg reports and the differences in the CAARs across different subsamples. Panel 1 presents the firm's CAARs for two subsamples of firms in terms of Hindenburg report age: (i) older firms reports from Hindenburg Research (the quartile of oldest reports) and (ii) recent firms reports from Hindenburg Research (the quartile of most recent reports). Panel 2 presents the firm's CAARs for two subsamples of firms in terms of the type of corporate malpractice: (i) the Hindenburg report results from a financial fraud by the firm; (ii) the Hindenburg report results from other reasons. The CAARs were estimated using the MM, FF3 and FF5, and daily returns for four different time windows [-1;+1]; [-5;+5]; [-5;+10] and [-10,+10] around the release of the Hindenburg firm's reports. $\theta 1$ and $\tau 1$ are the t-test statistics and Corrado rank test statistics, respectively of Brown & Warner (1980) and Corrado (1989) (see Serra, 2004, for more details). The significance of the differences in CAARs is determined via two-sample z-test. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

These results suggest the validation of hypothesis [H1]. Our results show a negative and statistically significant impact on the market value of the target company around the disclosure of forensic investigation reports of misconduct and corporate malpractices.

Further analysis also indicates that the type of misconduct and corporate malpractices and accumulated credibility of Hindenburg Research influence the magnitude of the impact caused by the announcements. Specifically, our findings show that reports indicating financial fraud [H2] have a higher negative and significative impact on market value of target firms compared to reports indicating non-financial misconduct or corporate malpractices. Consequently, we conclude that the type of the reported misconduct plays a crucial role in determining the magnitude of the market reaction.

Finally, we also conclude that the abnormal returns of targeted companies are higher negative for the more recent reports, which suggest that as the forensic investigation company increases its credibility in the market, by consistently publishing reports, the impact of these reports also intensifies. This result allows us to validate hypothesis [H3].

5.2 - CROSS-SECTIONAL ANALYSIS

We performed the cross-section impact of firm-specific characteristics variables on the abnormal returns of Hindenburg reports. The results in Table 5.3 show a higher negative stock market impact to the Hindenburg reports for smaller target firms with a higher Tobin's Q, consistent with Brendel & Ryans (2021). We also found a higher negative stock market reaction for higher leverage firms, aligning with the idea that short sellers target levered firms (Liu *et al*., 2024), and short-selling threats are linked to higher corporate default risk (Ni & Xu, 2023).

Table 5.2.1 - Cross-Sectional Analysis

	CAR [-1;1]	CAR [-5;5]	CAR [-5;10]	CAR [-10;10]
Constant	-0.324	0.171	0.327	0.093
	(-1.511)	(0.433)	(0.874)	(0.198)
Ln(SIZE)	0.012*	0.012*	0.023**	0.018*
	(1.830)	(1.890)	(2.184)	(1.799)
LEV	-0.111**	-0.198**	-0.228**	-0.177**
	(-2.179)	(-2.430)	(-2.420)	(-2.296)
ROA	0.123	0.117	0.135	0.150
	(1.009)	(0.934)	(1.455)	(1.530)
INST	-0.027	-0.110	-0.035	-0.028
	(-0.228)	(-0.570)	(-0.187)	(-0.424)
Tobin's Q	-0.037**	-0.034**	-0.033**	-0.042**
	(-2.416)	(-2.314)	(-2.339)	(-2.409)
FRAUD	-0.037	-0.124***	-0.235***	-0.222***
	(-0.511)	(-2.955)	(-3.805)	(-3.497)
Year Fixed Effects	Yes	Yes	Yes	Yes
# Obs.	50	50	50	50
R^2	0.441	0.529	0.527	0.542
Adj. R^2	0.348	0.420	0.422	0.435

This table presents the cross-sectional estimates for the CARs for the 50 analysed firms targeted in a Hindenburg report. The dependent variables are the firm's CARs for four different time windows: [-1;+1]; [-1;+5]; [-5;+5] and [-1,+10], calculated using MM. The firm-specific variables are the following: *SIZEi* is the market capitalization in USD (natural logarithm) for firm i; *LEVi* is the ratio of debt to total assets (%) for firm i; *ROAi* is the ratio of operating income to total average assets (%) for firm i; *INSTi* is the percentage of stock that are in possession of institutional investors (%) for firm i; *Tobin's Qi* is the ratio of market value to total average assets (%) for firm i; *FRAUDi* is a dummy variable that takes the value 1 if the corporate malpractice is due to the practice of financial fraud in firm i, and 0 otherwise. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively. P-values reported in parentheses are based on standard errors adjusted for heteroskedasticity and clustering at the country level. # Obs. denotes the number of observations used in the estimation.

6 – CONCLUDING REMARKS

This dissertation analyses the short-term market impact of 50 short-seller Hindenburg Reports on target firms. This study finds that target firms experience a significant negative impact on stock prices around the date of report disclosure. Additionally, show negative and statistically significant abnormal returns for target firms around the Hindenburg report disclosure date that seems like a torpedo effect. All wrongdoings, either caused by financial or non-financial fraud, seem to be bad news for target firms. The abnormal returns observed for target firms around the report disclosure date tend to be higher for more recent reports and when they involve financial corporate malpractices and misconduct. Finally, findings also evidence that the stock market reaction is more negative when target firms are small, highly leveraged, highly Tobin's Q, and experience financial fraud malpractice.

The results are consistent with market efficiency theory and asset price assumptions being expected that the stock market will respond negatively to the release of reports that highlight problems in the targeted companies, with the anticipation of a decline in the company's future cash flows. Thus, managers, analysts, and investors should heed news of financial and nonfinancial malpractice and misconduct from short sellers, as it can significantly affect the firm's market value. The results also reveal that non-financial frauds reveals important information about firms to stock market with potential impact on future cash flows.

While this research provides insightful implications, it is important to keep in mind its limitations. This dissertation was limited to studying the impact of public disclosures announcements of corporate malpractices and misconduct by the short-seller Hindenburg, so some care is needed in generalizing our findings to other short-sellers companies. In particular, it would be interesting to analyse if our results hold by other short-seller companies with more and less experience and located in other countries.

7 – REFERENCES

Amiram, D., Bozanic, Z., Cox, J. D., Dupont, Q., Karpoff, J. M. & Sloan, R. (2018). Financial Reporting Fraud and Other Forms of Misconduct: A Multidisciplinary Review of the Literature. *Review of Accounting Studies*, 23(2), 732–783.

Appel, I., & Fos, V. (2023). Short Campaigns by Hedge Funds. *Review of Financial Studies*, 37(5), 1460–1493. https://doi.org/10.1093/rfs/hhad092

Armour, J., Mayer, C. & Polo, A. (2017). Regulatory Sanctions and Reputational Damage in Financial Markets. *Journal of Financial and Quantitative Analysis*, 52(4), 1429–1448.

Asquith, P., Pathak, P. A., & Ritter, J. R. (2005). Short Interest, Institutional Ownership, and Stock Returns. *Journal of Financial Economics*, *78*(2), 243-276.

Bardos, K. S., Ertugrul, M., & Gao, L. S. (2020). Corporate Social Responsibility, Product Market Perception, and Firm Value. *Journal of Corporate Finance*, 62, 101588. https://doi.org/10.1016/j.jcorpfin.2020.101588

Benabou, R. & Laroque, G. (1992). Using Privileged Information to Manipulate Markets: Insiders, Gurus, and Credibility. *The Quarterly Journal of Economics*, 107(3), 921–958.

Boehmer, E., Jones, C. M. & Zhang, X. (2008). Which Shorts are Informed?. *The Journal of Finance*, 63(2), 491-527.

Brav, A., Jiang, W., Partnoy, F. & Thomas, R. (2008). Hedge Fund Activism, Corporate Governance, and Firm Performance. *The Journal of Finance*, 63 (4), 1729–75.

Brendel, J. & Ryans, J. (2021). Responding to Activist Short Sellers: Allegations, Firm Responses, and Outcomes. *Journal of Accounting Research*, 59(2), 487–528.

Brown, S. J. & Warner, J. B. (1980). Measuring Security Price Performance. *Journal of Financial Economics*, 8(3), 205-258.

Brown, S. J. & Warner, J. B. (1985). Using Daily Stock Returns. *Journal of Financial Economics*, 14(1), 3–31. https://doi.org/10.1016/0304-405X(85)90042-X

Brunnermeier, M. K. & Oehmke, M. (2013). Predatory Short Selling. *Review of Finance*, *18*(6), 2153–2195. https://doi.org/10.1093/rof/rft043

Bryman, A. (2008) *Social Research Methods*, 4th edition, Oxford University Press, New York.

Cao, G., Geng, W., Zhang, J. & Li, Q. (2023). Financial Constraints, Short Selling and Corporate Fraud: Evidence from China. *Australian Economic Papers*, 62(2), 297-320.

Carberry, E. J., Engelen, P. J. & Van Essen, M. (2018). Which Firms Get Punished for Unethical Behavior? Explaining Variation in Stock Market Reactions to Corporate Misconduct. *Business Ethics Quarterly*, 28(2), 119-151.

Chang, E. C., Lin, T. C. & Ma, X. (2019). Does short-selling threat discipline managers in mergers and acquisitions decisions? *Journal of Accounting and Economics*, 68(1), 101223. https://doi.org/10.1016/j.jacceco.2018.12.002

Christophe, S. E., Ferri, M. & Hsieh, J. (2010). Informed Trading Before Analyst Downgrades: Evidence from Short Sellers. *Journal of Financial Economics*, 95(1), 85–106.

Collings, D., Corbet, S., Hou, Y. G., Hu, Y., Larkin, C. & Oxley, L. (2022). The Effects of Negative Reputational Contagion on International Airlines: The Case of the Boeing 737-MAX Disasters. *International Review of Financial Analysis*, 80, 102048.

Corrado, C. J. (1989). A nonparametric Test for Abnormal Security-Price Performance in Event Studies. *Journal of Financial Economics*, 23(2), 385-395.

Cumming, D., Dannhauser, R., & Johan, S. (2015). Financial Market Misconduct and Agency Conflicts: A Synthesis and Future Directions. *Journal of Corporate Finance*, 34, 150-168.

Dechow, P. M., Hutton, A. P., Meulbroek, L. & Sloan, R. G. (2001). Short-sellers, fundamental analysis, and stock returns$. *Journal of Financial Economics*, 61, 77–106.

Deng, S., Willis, R. H. & Xu, L. (2014). Shareholder Litigation, Reputational Loss, and Bank Loan Contracting. *Journal of Financial and Quantitative Analysis*, 49(4), 1101-1132.

Diether, K. B., Lee, K. H. & Werner, I. M. (2009). Short-Sale Strategies and Return Predictability. *Review of Financial Studies*, 22(2), 575–607.

Di Maggio, M., Franzoni, F. A., Massa, M. & Tubaldi, R. (2019). Strategic Trading as a Response to Short Sellers. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3357801

Dyck, A., Morse, A. & Zingales, L. (2024). How Pervasive is Corporate Fraud?. *Review of Accounting Studies*, 29(1), 736-769.

Fama, E. F., Fisher, L., Jensen, M. C. & Roll, R. (1969). The Adjustment of Stock Prices to New Information. *International Economic Review*, 10(1), 1–21. https://doi.org/10.2307/2525569

Fama, E. F., & French, K. R. (1992). The Cross-Section of Expected Stock Returns. *The Journal of Finance*, 47(2), 427-465.

Fama, E. F., & French, K. R. (2015). A Five-Factor Asset Pricing Model. *Journal of Financial Economics*, 116(1), 1-22.

Fang, V. W., Huang, A. H., and Karpoff, J. M. (2016). Short Selling and Earnings Management: A Controlled Experiment. *The Journal of Finance*, 71(3), 1251-1294.

Feng, X., Chan, K. C., and Yang, D. (2017). Short sale constraints, dispersion of opinion, and stock overvaluation: Evidence from earnings announcements in China. *The North American Journal of Economics and Finance*, 41, 217-230.

Gao, K., and Ding, M. (2019). Short-Sale Refinancing and Price Adjustment Speed to Bad News: Evidence from a Quasi-natural Experiment in China. *China Journal of Accounting Research*, 12(4), 379-394.

Gee, J., Button, D. M. & Brooks, G. (2011). *The financial cost of fraud*. MacIntyre Hudson, Milton Keynes.

Goldstein, I. & Guembel, A. (2008). Manipulation and the Allocational Role of Prices. *Review of Economic Studies*, 75(1), 133–164.

Guan, J., Lam, B. M., Lam, C. C. & Liu, M. (2022). CEO Overconfidence and the Level of Short-selling Activity. *Review of Quantitative Finance and Accounting*, 58(2), 685-708.

Grullon, G, Michenaud S. & Weston, J. (2015). The Real Effects of Short-Selling Constraints. *The Review of Financial Studies*, 28 (6), 1737–1767.

Horvat, T., & Lipičnik, M. (2016). Internal Audits of Frauds in Accounting Statements of a Construction Company. *Strategic Management Journal*, 21(4), 29–36.

Humphrey, P., Carter, D. A. & Simkins, B. (2016). The Market's Reaction to Unexpected, Catastrophic Events: The Case of Oil and Gas Stock Returns and the Gulf Oil Spill. *The Journal of Risk Finance*, 17(1), 2-25.

Jackson, G., & Apostolakou, A. (2010). Corporate Social Responsibility in Western Europe: An Institutional Mirror or Substitute? *Journal of Business Ethics*, 94(3), 371–394. https://doi.org/10.1007/s10551-009-0269-8

Jensen, M.C. & Meckling, W.H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, 3 (4), 305-360.

Jiang, H., Habib, A. & Hasan, M. M. (2022). Short Selling: A Review of the Literature and Implications for Future Research. *European Accounting Review*, 31(1), 1-31.

Johnson, W. C., Xie, W. & Yi, S. (2014). Corporate Fraud and the Value of Reputations in the Product Market. *Journal of Corporate Finance*, 25, 16-39.

Kane, E. J. (2004). Continuing dangers of disinformation in corporate accounting reports. *Review of Financial Economics*, 13(1–2), 149–164. https://doi.org/10.1016/j.rfe.2003.09.007

Karajian, S. & Ullah, S. (2022). Consequences of Fraud and Overcoming Negative Market Reaction. *Global Finance Journal*, 52, 100635.

Karpoff, J. M. & Lou, X. (2010). Short Sellers and Financial Misconduct. *The Journal of Finance*, 65(5), 1879-1913.

Karpoff, J. M., Lee, D. S. & Martin, G. S. (2008). The Cost to Firms of Cooking the Books. *Journal of Financial and Quantitative Analysis*, 43(3), 581–611.

Klimczak, K. M., Sison, A. J. G., Prats, M. & Torres, M. B. (2022). How to Deter Financial Misconduct if Crime Pays?. *Journal of Business Ethics*, 179(1), 205-222.

Laan, S. van der. (2009). The Role of Theory in Explaining Motivation for Corporate Social Disclosures: Voluntary Disclosures vs 'Solicited' Disclosures. *The Australasian Accounting Business and Finance Journal*, 3(4), 15.

Li, Y. & Zhang, L. (2015). Short Selling Pressure, Stock Price Behavior, and Management Forecast Precision: Evidence from a Natural Experiment. *Journal of Accounting Research*, 53(1), 79–117.

Ljungqvist, A. & Qian, W. (2016). How Constraining Are Limits to Arbitrage? *The Review of Financial Studies*, 29(8), 1975–2028.

Liu, C., Low, A. & Putnins, T. (2024). The Real Impacts of Public Short Campaigns: Evidence from Stakeholders. *Journal of Corporate Finance*, 88, 102624.

MacKinlay, A. C. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, 35(1), 13–39.

Marciukaityte, D., Szewczyk, S. H., Uzun, H., & Varma, R. (2006). Governance and Performance Changes after Accusations of Corporate Fraud. *Financial Analysts Journal*.

Marino, M., Parrotta, P., Sala, D. & Valletta, G. (2024). The Volkswagen Emissions Scandal: Exploring the Role of Environmental Concern and Social Norms. *Journal of Environmental Economics and Management*, 127, 103019, 1-20.

Martins, A. M., Correia, P. & Gouveia, R. (2023). Russia-Ukraine Conflict: The Effect on European Banks' Stock Market Returns. *Journal of Multinational Financial Management*, 67, 100786.

Meng, Q., Huang, H., Li, X. & Wang, S. (2023). Short-selling and Corporate Default Risk: Evidence from China. *International Review of Economics and Finance*, 87, 398-417.

Michelon, G., Rodrigue, M. & Trevisan, E. (2020). The marketization of a social movement: Activists, shareholders and CSR disclosure. *Accounting, Organizations and Society*, 80, 101074. https://doi.org/10.1016/j.aos.2019.101074

Ni, X. & Xu, H. (2023). Are short selling threats beneficial to creditors? Insights from corporate default risk. *Pacific-Basin Finance Journal*, *81*, 102117–102117. https://doi.org/10.1016/j.pacfin.2023.102117

Paugam, L., Stolowy, H. & Gendron, Y. (2021). Deploying Narrative Economics to Understand Financial Market Dynamics: An Analysis of Activist Short sellers' Rhetoric. *Contemporary Accounting Research*, 38(3), 1809-1848.

Parmar, B. L., Freeman, R. E., Harrison, J. S., Wicks, A. C., Purnell, L., & De Colle, S. (2010). Stakeholder Theory: The State of the Art. *The Academy of Management Annals*, 4(1), 403-445.

Phillips, R. (2003). Stakeholder Legitimacy. *Business Ethics Quarterly*, 13(1), 25-41.

Santana, A. (2012). Three Elements of Stakeholder Legitimacy. *Journal of Business Ethics*, 105, 257-265.

Sapra, N., Kakran, S., Sidhu, A. & Kumar, A. (2024). Unmasking Market Turmoil by Decoding Stock Market Dynamics Post-Fraud Allegations: Evidence from Adani-Hindenburg Case. *Journal of Corporate Accounting and Finance*. 35 (3), 75-88.

Saunders, M., Lewis, P. & Thornhill, A. (2007) *Research Methods for Business Students*, 4th edition. FT-Prentice Hall. England.

Serra, A. P. (2004). Event Study Tests: A Brief Survey. Management.Org-Electronic *Journal of Organizational Management*, 2(3), 248–255.

Shi, W., & DesJardine, M. R. (2022). Under Attack! CEO Implicit Motives and Firm Competitive Responses Following Short Seller Activism. *Organization Science*, 33(3), 991-1017.

Sims, R. R. (1992). The Challenge of Ethical Behavior in Organizations. *Journal of Business Ethics*, 11, 505-513.

Somaya, D. & You, J. (2024). Scalability, Venture Capital Availability, and Unicorns: Evidence from the Valuation and Timing of IPOs. *Journal of Business Venturing*, 39(1), 106345.

Sun, Y., Sun, X. & Wu, W. (2021). Who Detects Corporate Fraud under the Thriving of the New Media? Evidence from Chinese-listed Firms. *Accounting and Finance*, 61, 1313-1343.

Sun, M. & Xu, W. (2024). Short Selling and Readability in Financial Disclosures: A Controlled Experiment, *Financial Review*. 59, 265-292.

Szczuka, M. (2015). Social Dimension of Sustainability in CSR Standards. *Procedia Manufacturing*, 3, 4800–4807. https://doi.org/10.1016/j.promfg.2015.07.587

Unsal, O. & Hippler, W. (2024). Corporate Misconduct and Innovation: Evidence from the Pharmaceutical Industry, *Research in International Business and Finance*, 71, 102490.

Yang, Y. & Liu, W. (2024). Corporate Non-financial Misconduct and Accounting Conservatism. *Accounting and Finance*, 64(3), 2635-2670.

8 – APPENDIX

Appendix A: Sample Distribution

#	Firm Name	Report Date	Head-quarters	#	Firm Name	Report Date	Head-quarters
1	Opko Health	17/11/17	USA	26	Clover Health	04/02/21	USA
2	Riot Blockchain	11/12/17	USA	27	Ormat	01/03/21	USA
3	Marathon Patent Group	13/12/17	USA	28	The Lordstown Motors	12/03/21	USA
4	Soul Entertainment	14/02/18	USA	29	Ebang	06/04/21	USA
5	Pulse Biosciences	24/04/18	USA	30	PureCycle	06/05/21	USA
6	Inpixon	30/04/18	USA	31	HUMBL	20/05/21	USA
7	Apollo Medical	04/09/18	USA	32	DraftKings	15/06/21	USA
8	Genworth Financial	01/11/18	USA	33	Tecnoglass	09/12/21	USA
9	Yangtze River Port L.L.	06/12/18	USA	34	Standard Lithium	03/02/22	USA
10	Eros Intern.Media L.	09/06/19	INDIA	35	Natera	09/03/22	USA
11	Predictive T. G.	11/07/19	USA	36	Mullen Automotive	06/04/22	USA
12	DaVita	13/08/19	USA	37	Singularity Future T.	05/05/22	USA
13	Bloom Energy	17/09/19	USA	38	EBIX	16/06/22	USA
14	Opera	16/01/20	USA	39	Establishment Labs	19/10/22	USA
15	Nextech	10/02/20	USA	40	Welltower	07/12/22	USA
16	PharmaCielo	02/03/20	USA	41	Adani Enterprises Ltd	24/01/23	INDIA
17	HF Foods	23/03/20	USA	42	Adani Green Energy	24/01/23	INDIA
18	New Pacific Metals C.	20/04/20	CANADA	43	Adani Ports and SEZ	24/01/23	INDIA
19	China Metal Re. U. Ltd	17/05/20	CHINA	44	Adani Power	24/01/23	INDIA
20	Sorrento Therapeutics	20/05/20	USA	45	Adani Total Gas	24/01/23	INDIA
21	Ideanomics	26/06/20	USA	46	Adani Wilmar	24/01/23	INDIA
22	GrowGeneration	21/08/20	USA	47	Block Inc.	23/03/23	USA
23	Nikola	10/09/20	USA	48	Icahn Enterprises	02/05/23	USA
24	Loop Industries	13/10/20	USA	49	Tingo Group	06/06/23	USA
25	Kandi	30/11/20	USA	50	Freedom Holding Corp.	15/08/23	RUSSIA

This table presents the list of firms with a short seller report disclosure to the financial market. This list is based on Hindenburg Research report, that are available here: https://hindenburgresearch.com/