UNIVERSITY OF LJUBLJANA

FACULTY OF ECONOMICS

MASTER THESIS

THE EFFECT OF TERRORIST ATTACKS ON THE STOCK RETURNS OF INSURANCE COMPANIES IN THE EUROPEAN UNION

Ljubljana, November 2023 MARIO GAĆEŠA

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TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AR (sl. Nenormalni donosi); Abnormal Returns

ARCH (sl. Avtoregresivna pogojna heteroskedastičnost); Autoregressive Conditional Heteroskedasticity

BME (sl. Španske borze in trgi); Bolsas y Mercados Españoles

CEO (sl. Glavni izvršni direktor); Chief Executive Officer

DPS (sl. Dividenda na delnico); Dividends Per Share

EMH (sl. Hipoteza učinkovitega trga); Efficient Market Hypothesis

EPS (sl. Dobiček na delnico); Earnings Per Share

GARCH (sl. Generalizirana avtoregresivna pogojna heteroskedastičnost); Generalized Autoregressive Conditional Heteroskedasticity

GDP (sl. Bruto domači proizvod): Gross Domestic Product

IPO (sl. Začetna javna ponudba); Initial Public Offering

IRR (sl. Notranja stopnja donosa); Internal Rate of Return

M&A (sl. Združevanje in prevzem); Merger and Acquisition

STATA (sl. Statistična programska oprema za podatkovno znanost); Statistical software or data science

sl. - Slovene

INTRODUCTION

Stock markets are organized markets where shares of publicly traded companies are bought and sold. They play a vital role in the global economy by providing companies with a platform to raise capital and investors with a means to purchase ownership stakes in those companies. Also known as equity markets, stock markets allow companies to raise capital by issuing shares of their stock. These shares are then available for purchase by investors. When an investor purchases shares of stock in a company, they are essentially buying a small piece of that company. This ownership stake entitles the investor to certain rights, such as the right to receive dividends (if the company pays them) and the right to vote on corporate matters. Stock markets also offer investors the potential to profit from their investments. If the value of a company's stock increases, investors can sell their shares at a profit. However, stock markets are also volatile, and the value of stocks can go down as well as up. This means that investors also face the risk of losing money if the value of their stocks declines.

Stock market indices serve as invaluable tools for investors and traders, offering a concise snapshot of overall market or sector performance (John & Ezeabasili, 2020). These indices are derived by aggregating the prices of a selected group of stocks, with their weightings often reflecting the significance of the companies within the index (John & Ezeabasili, 2020). Prominent indices such as the Dow Jones Industrial Average, S&P 500, NASDAQ Composite, Russell 2000, and FTSE100 provide essential benchmarks for assessing investment strategies and monitoring portfolio performance (Chen, 2023). By offering a clear barometer of market trends and sentiment, these indices empower stakeholders to make well-informed decisions, ensuring their investments align with their financial goals and risk tolerance, ultimately contributing to a more efficient and transparent financial marketplace.

When people think of investing, they usually think of the stock market because stocks are the most common type of security traded and represent ownership in a company. Cam and Ramiah (2014) analyze how investors behave in the presence of large-scale disasters, such as the 9/11 terrorist attacks. In their 2014 study, Cam and Ramiah identified notable instances of stock price overreactions, a phenomenon consistent with the availability bias documented in behavioral finance research. It's reasonable that investors might react in this manner, especially considering the unique nature of the damages incurred and the substantial media coverage these events typically receive (Cam & Ramiah, 2014). Such circumstances can lead investors to potentially make incorrect decisions by assuming the likelihood of similar events reoccurring, illustrating the impact of the availability bias on their decision-making processes. It's crucial to emphasize that stock market indices cannot be directly invested in as standalone instruments. Investors cannot directly buy or sell an index. However, there are a number of index funds and exchange trade funds that track stock market indices, which allows investors to invest in the index indirectly. Stock market indices are an important tool for investors and traders of all levels of experience. By understanding how indices work and how to use them, investors can make more informed investment decisions.

The stock market exhibits susceptibility to an array of both economic and non-economic determinants, encompassing political crises, economic adversities, financial apprehensions, currency constraints, and acts of terrorism (Drakos, 2010; Markoulis & Katsikides, 2018). These factors can exert a substantial influence on the domestic economy, as well as on the interconnected global economic landscape (Drakos, 2010; Markoulis & Katsikides, 2018).

This master's thesis intends to investigate insurance operations and associated risks, followed by a comprehensive analysis of the insurance markets situated in Madrid, Paris, and London. The principal aim of this research endeavor is to assess the impact of terrorist attacks on the stock performance of insurance entities within the European Union throughout the timeframe spanning 2004 to 2018. To fulfill this objective, the thesis will employ the event study methodology for the assessment of stock return dynamics concerning prominent terrorist attacks occurring within the United Kingdom, France, and Spain (Woon, 2004). The event study methodology constitutes a research approach utilized to investigate the repercussions of an event on the financial market, encompassing a spectrum of events ranging from corporate mergers, acquisitions, natural disasters, to acts of terrorism (Woon, 2004). By employing the event study methodology, the thesis will discern any deviations from expected returns within the stock market proximate to the event date. Subsequently, the insights derived from the event study will be leveraged to formulate conclusions regarding the influence of terrorist attacks on the stock performance of insurance firms within the European Union.

This thesis will examine the determinants of stock performance of insurance companies and all potential factors affecting them, such as the type of capital market, arrival of new information, and terrorist attacks. The thesis will use the one-way ANOVA test combined with the Pattel and mean difference t-test in STATA to answer the following research questions:

- Do terrorist attacks have an impact on the abnormal returns (hereinafter: AR) of securities on the capital market?
- Do terrorist attacks have an impact on the AR of insurance companies?

The thesis will divide the main research question into two subquestions:

- To analyze the impact of the terrorist attacks in Madrid in 2004, London in 2005, and Paris in 2015 on the stock price index of securities on the capital markets IBEX35, FTSE100, and CAC40 (by analyzing ARs).
- To analyze the impact of the aforementioned terrorist attacks on the ARs of the insurance companies on IBEX35, FTSE100, and CAC40.

By answering these research questions, the thesis aims to shed light on the primary research query concerning how terrorist attacks impact the stock performance of insurance firms operating within the European Union. I am particularly interested in the use of the one-way ANOVA test combined with the Pattel and mean difference t-test in STATA. This is a robust

statistical approach that will allow me to compare the ARs of different groups of securities, such as insurance companies and capital markets. I firmly believe that this thesis will make a substantial and valuable addition to the existing body of literature regarding the influence of terrorist attacks on stock performance.

1 BACKGROUND

1.1 Terrorism and financial markets

According to Laquer (1999), terrorism can be defined as the illicit utilization of force and intimidation to promote a political agenda, frequently targeting innocent individuals. This phenomenon extends its impact to numerous nations, encompassing both developed and developing ones. Terrorism can create a sense of fear, insecurity, and uncertainty, which can have a significant impact on economies and financial markets. In a previous study, Chen and Siems (2004) examined the economic costs of terrorism in the United States by analyzing 14 cases of terrorist attacks or wars since 1915. Their research findings indicated that terrorism could exert a notable influence on the stock market, resulting in stock price declines and heightened levels of market volatility. However, they also found that the stock market tends to recover from terrorist attacks over time. Terrorism is a complex and multifaceted phenomenon, and terrorist organizations use a variety of tactics to achieve their goals. These tactics can range from targeted attacks on individuals or groups to large-scale attacks on infrastructure or civilian populations. Terrorism can find its motivation in a range of factors, encompassing political considerations, religious convictions, and ideological extremism. It is important to note that there is no single definition of terrorism that is universally accepted. However, the above paraphrase captures the key elements of terrorism, including its unlawful nature, its use of violence and intimidation, and its pursuit of political aims.

Terrorism is characterized as the illicit employment of violence and intimidation, primarily directed towards civilians, with the objective of accomplishing political objectives. It is distinguished from violence directed at the state, which typically targets military personnel and government officials (Laquer 1999). Terrorism is characterized by its intention to cause terror and panic in the population. Research by Frey, Luechinger, and Stutzer (2007) has shown that terrorism has a significant negative impact on life satisfaction. They argue that the cost of terrorism to individuals is equivalent to a substantial pay cut. Terrorism also exerts a substantial influence on the economic landscape. The tangible repercussions of terrorism are experienced by industries and sectors directly impacted by such incidents, which include aviation, tourism, and investment. The indirect impact of terrorism is more difficult to quantify, but it is reflected in the atmosphere of uncertainty and insecurity that follows attacks. Capital markets are particularly vulnerable to both the direct and indirect

impacts of terrorism. Shares in companies that are directly affected by attacks will suffer, and all stocks and indices will suffer from the uncertainty and insecurity that follows.

Terrorist events in one country can have a negative external impact on tourism in neighboring countries. This is because tourists may avoid traveling to a region that is perceived as being at risk of terrorism. This can have a significant economic impact on neighboring countries, as tourism is a major source of revenue for many countries. In addition to the direct impact on tourism, terrorism can also have a number of other adverse economic and financial effects. According to Johnston and Nedelescu (2005) and Lenain, Bonturi, and Koen (2002), these include:

- Reduced human and physical capital: Terrorism can lead to the loss of life and property, which can reduce the productive capacity of an economy.
- Escalating expenditures on regulatory measures related to finance and counter-terrorism: Governments may find it necessary to augment financial resources allocated to security and counter-terrorism initiatives, potentially diverting resources from other economically productive endeavors.
- Vulnerability of critical infrastructure: Terrorist attacks can damage or destroy critical infrastructure, such as power plants, transportation networks, and communication systems. This can disrupt economic activity and lead to higher costs for businesses and consumers.
- Increased financial instability: Terrorism can lead to uncertainty and volatility in financial markets, which can make it more difficult for businesses to invest and grow.
- Destruction of market infrastructure and operations: Terrorist attacks can damage or destroy physical and electronic market infrastructure, such as stock exchanges and trading platforms. This can disrupt economic activity and lead to higher costs for investors and businesses.
- Decreased investor confidence: Terrorism can result in a reduction in investor confidence, creating challenges for enterprises in securing capital and initiating new projects.

Terrorism risk is a major concern for insurance and reinsurance companies, due to its enormous loss potential. The substantial financial requirements associated with terrorism risk may result in elevated insurance premiums, shifting this risk to reinsurance companies, which possess expertise in managing extensive and intricate risk profiles (Johnston and Nedelescu, 2005). One of the main challenges for both insurance and reinsurance companies is quantifying terrorism risk. This is difficult because terrorist attacks are relatively rare and unpredictable. However, some models have been developed to help quantify terrorism risk, and these models are often linked to catastrophe modeling. Terrorism risk exhibits parallels with natural disasters like earthquakes, storms, hurricanes and floods due to their shared capacity to inflict extensive losses and exert a profound impact on entire economic systems (Reshetar, 2008). A compelling illustration of this catastrophic potential can be found in the events of September 11, 2001, which underscored terrorism's potential as a monumental risk,

as evidenced by insured losses surpassing $30 billion (Dudley, 2016). However, there are some important differences between terrorist attacks and natural hazards. For example, terrorist attacks are intentional, while natural hazards are not. Additionally, the location of a natural hazard can often be predicted with more accuracy than the location of a terrorist attack. The difficulty of quantifying terrorism risk and the unpredictable nature of terrorist attacks make it challenging for insurance and reinsurance companies to manage this risk. However, these companies are taking steps to address these challenges, such as developing new risk assessment models and working with governments and other stakeholders to reduce the risk of terrorism.

Terrorist incidents are marked by an inherent and fluid uncertainty, encompassing factors such as their nature, intended targets, locations, and timing of occurrence (Institute for Economics & Peace, 2016). This inherent unpredictability renders the anticipation and prevention of such events challenging. Terrorist entities possess the capacity to adapt their tactics in response to heightened security measures, rendering their tracking and apprehension a complex endeavor (Institute for Economics & Peace, 2016). In contrast, natural disasters often exhibit a higher degree of predictability, enabling a more precise identification of their locations (Reshetar, 2008). Consequently, measures aimed at mitigating the impact of natural disasters, while prevention may not be entirely achievable, can be more effectively implemented. The dynamic uncertainty of terrorist events poses a significant challenge to counterterrorism efforts. It is difficult to develop and implement effective counterterrorism strategies when the threat is constantly evolving. Becker and Rubinstein (2011), stated that there are several things that governments and other stakeholders can do to mitigate the risk of terrorism, such as:

- Conducting intelligence analysis to identify and track potential terrorist threats.
- Implementing security measures to protect vulnerable targets.
- Engaging in efforts to tackle the underlying drivers of terrorism, including factors such as economic deprivation, disparities in wealth, and political instability.
- Promoting tolerance and understanding between different groups.
- By taking these steps, governments and other stakeholders can help to reduce the risk of terrorism and create a more secure world.

The main challenge in quantifying and controlling terrorism risk is its dynamic and uncertain nature (Chen & Siems 2004). Terrorist attacks are difficult to predict because they can be carried out by small, secretive groups using a variety of methods. Additionally, terrorist motivations are often complex and ideological, making them difficult to deter with traditional security measures. Analysts encounter the obstacle of constrained historical data concerning losses attributable to terrorism. Moreover, even if an abundance of such data were accessible, it may not comprehensively encapsulate the evolving strategies and motivations of contemporary terrorist organizations (Chesney, Reshetar & Karaman, 2011). Conversely, the probabilities and ramifications associated with natural hazards can be more readily modeled and quantified using established frameworks and historical records. As a

result of these factors, terrorism risk is much more challenging to control than the risk of natural hazards. Governments and other stakeholders can take steps to mitigate terrorism risk, such as conducting intelligence analysis, implementing security measures, and addressing the root causes of terrorism. However, the dynamic and uncertain nature of terrorism makes it difficult to completely eliminate the risk of terrorist attacks.

As delineated by the research of Enders, Sandler, and Gaibulloev (2011), terrorism can be characterized as the intentional deployment or the menace of violence by individuals or collectives directed at non-combatant populations, with the intent of realizing political or societal objectives via the instillation of fear and intimidation. Schelling (1991) posits that terrorist activities serve as a method to attain not only media visibility as a mode of conveying messages to the public but also to engender economic and political turmoil. This definition encapsulates the fundamental components of terrorism, including its deliberate planning, the employment of violence against civilians, and its underlying political or societal objectives. It is noteworthy that terrorism can exert a substantial influence on the economic and political equilibrium of a nation or geographic area. Terrorism, while multifaceted in its motivations, fundamentally constitutes a manifestation of political violence. Thus, comprehending the essence of terrorism is imperative for the formulation of efficacious counterterrorism strategies.

Governments targeted by terrorist entities are compelled to carefully consider the economic and strategic ramifications of acceding to certain aspects of the terrorists' demands, juxtaposed against the enduring costs entailed by a protracted terrorist campaign that may emerge from a stance of continued resistance, as discussed by Enders and Sandler in their work published in 2011. When terrorists successfully destabilize an economy, the (opportunity) costs of continued resistance rise, making it more likely that the government will be willing to accommodate the terrorists' demands. This is because economic destabilization can have a number of negative consequences, such as reduced economic activity, increased unemployment, higher inflation, and decreased investor confidence. These consequences can make it difficult for the government to maintain public support and to carry out its basic functions. Governments must weigh the costs and benefits of different options and make the decision that they believe is best for their country. Some of the factors that governments may consider when making this decision include the nature of the terrorists' demands, the likelihood of the terrorists following through on their threats, the potential damage that could be caused by a prolonged terrorist campaign, the public's willingness to support the government's counterterrorism efforts, and the government's own resources and capabilities (Enders & Sandler, 2011). It is important to note that there is no easy answer to this question. Governments must balance the need to protect their citizens from terrorism with the need to avoid giving in to terrorists' demands.

The influence of terrorism on business performance may exhibit variability contingent upon several determinants, including the sector of operation, the size of the enterprise, and its geographical location.

1.2 Stock performance

Stock performance pertains to the evaluation of a stock's capacity to generate financial gains for its shareholders (Zhang and Wiersema 2009). When the stock price increases, the stock is considered to be performing well. Conversely, when the stock price decreases, the stock is considered to be performing poorly. Numerous factors can affect a stock's performance, according to Zhang and Wiersema (2009), including:

- The overall health of the economy: When the economy is doing well, businesses tend to be more profitable, and investors are more likely to invest in stocks. This can drive stock prices higher. Conversely, during economic downturns, businesses often experience reduced profitability, prompting investors to exhibit a greater inclination toward divesting their stock holdings, consequently contributing to a decline in stock prices.
- The shape of the equity market: The equity market is cyclical, meaning that it goes through periods of ups and downs. In a bull market, there is typically an upward trend in stock prices, whereas in a bear market, stock prices tend to decline, thus exerting a substantial influence on the performance of individual stocks.
- Company-specific factors: A number of company-specific factors can also affect stock performance, including financial performance, management, and industry outlook. A company with strong financial performance and a competent management team is more likely to experience an increase in its stock price than a company with weak financial performance and an incompetent management team. Additionally, the outlook for the industry in which a company operates can also affect its stock performance. For example, if the outlook for the industry is positive, investors are more inclined to allocate their investments towards stocks within that specific industry. Conversely, if the outlook for the industry is negative, investors are more likely to sell stocks in that industry.

Investors should carefully consider all of these factors when making investment decisions.

Fama (1965) argues that within an efficient market, the presence of numerous rational actors engenders a scenario in which, at any given juncture, the prevailing prices of individual securities inherently encompass the repercussions of all accessible information, encompassing historical and future data.

In an effectively operating market, the present valuation of a security closely approximates its intrinsic value, and consequently, price adjustments occur primarily upon the emergence of fresh information. The transitions in prices between consecutive periods are anticipated to be autonomous, provided there is no foreseen cause for the introduction of new information (Tavares, 2004). The return on a stock can alternatively be characterized as the contrast in worth between the moment of acquisition and the moment of divestiture, augmented by any revenue accrued throughout that interim, as outlined by Tavares in 2004. Investors rationally strive to maximize this value, which is the foundation of finance and investment. This rephrased version is more concise and formal, and it uses more academic

terminology such as "intrinsic value," "independent," and "foundation." Additionally, it elucidates that the efficient market hypothesis operates under the premise that investors are rational actors with access to the entirety of accessible information (Nagy, 2017).

The performance of a corporation is typically mirrored by its stock valuation. Companies with good performance are likely to have high demand for their shares, which drives up the price. Conversely, companies with poor performance are likely to have low demand for their shares, which drives down the price. However, there are also factors that can manipulate stock prices, such as rumors, speculation, and short selling. These factors can cause stock prices to fluctuate in the short term, but they do not always reflect the underlying value of the company. Fundamental analysis, which examines a company's financial statements and other factors to assess its intrinsic value, can provide a more accurate picture of a company's performance. Fama (1965) argued that the stock price of a company reflects its performance over time. Profitability serves as a fundamental metric for evaluating a company's performance and often demonstrates a connection with the valuation of its equities (Fama, 1965). Additional factors that can exert an influence on stock prices encompass the company's overall health, industry projections, and the prevailing conditions within the broader market. For example, rumors of a merger between two companies may drive up the stock price of both companies, while low quarterly earnings may cause investors to sell shares of a company, driving down the price. While the performance of a stock is often correlated with the overall performance of the affiliated company, the day-to-day fluctuations in the stock's market price may not consistently align with its intrinsic long-term worth or future potential (Capozzi, n.d.). For instance, there are situations where a stock may demonstrate suboptimal performance on a day that coincides with the release of unfavorable government economic data, but it is important to note that such an occurrence does not invariably signify an underlying fundamental weakness in the company. Investors should focus on investing in companies with strong fundamentals and good long-term prospects. They should also be aware of the factors that can manipulate stock prices and avoid making investment decisions based on short-term fluctuations (Capozzi, n.d.).

Financial news can influence the stock market in the short term, but its long-term impact on individual companies is generally limited (Dudley, 2016). Long-term investors tend to exhibit greater resilience in retaining their stock holdings amidst economic downturns or the dissemination of unfavorable financial news, with their focus directed toward the underlying performance of the company. In contrast, short-term investors tend to display heightened sensitivity to economic and financial news developments (Dudley, 2016). For brokers aiming for swift profits, it is common practice to divest their stock positions when prices surge in response to positive news (Dudley, 2016). This divergence in investor behavior highlights the varying degrees of attention placed on external factors by different investment strategies, with long-term investors often guided by a more comprehensive assessment of a company's fundamentals while short-term investors react swiftly to market events. It is important to note that even the most well-informed predictions about stock performance can

be spoiled by unforeseen events. Unforeseen events like natural disasters, bubbles, and terrorism can swiftly harm stock prices, affecting both long-term and short-term investors (Reshetar, 2008).

1.3 The economic cost of the terrorism

Terrorist attacks represent a profound shock to economies and financial markets, frequently resulting in substantial short-term and enduring repercussions. Nevertheless, scholars assert that the link between terrorist attacks and their economic impact requires additional substantiation through empirical research, as indicated by the studies conducted by Drakos in 2010 and Eldor and Melnick in 2004. This suggests the necessity for comprehensive empirical analysis to fortify our understanding of the intricate dynamics surrounding terrorism's influence on economic and market variables.

Terrorist attacks have well-documented impacts on stock markets, leading to direct financial losses and increased vulnerability to future attacks. Various studies, such as those by Aksoy (2014), Arin, Ciferri, and Spagnolo (2008), Eruygur and Omay (2014), and Nikkinen and Vähämaa (2010), emphasize these consequences. Additionally, Tavares (2004) highlights the negative effect of terrorism on economic growth, Crain and Crain (2006) find a correlation with reduced GDP, and research by Blomberg, Hess, and Orphanides (2004) reveals adverse effects on exchange flows. These findings underscore the complex impact of terrorism on financial and economic aspects, emphasizing the need for further empirical investigation.

As elucidated by the research of Nitsch and Schumacher in 2004, it is discerned that terrorist attacks are associated with a notable reduction of approximately 4% in stock exchange trading activity. The findings present persuasive evidence indicating that instances of terrorism exert a diminishing effect on trade volume. The examination specifically delves into bilateral trade relationships spanning over 200 countries from 1960 to 1993, employing an augmented gravity model enriched with various indicators of terrorism and extensive violence. This empirical observation underscores the impact of such events on financial market dynamics, emphasizing the significance of comprehending the ramifications of terrorism in the context of stock exchange trade. Countries frequently targeted by terrorism tend to recover faster, as investor uncertainty decreases. Nonetheless, economic losses due to terrorism have surged elevenfold in the past 15 years (Dudley, 2016). The human toll is also significant, with global terrorist-related deaths rising from 11,000 in 2007 to over 26,000 in 2019, alongside a rise in attacks from 2,800 to almost 11,000 (Institute for Economics and Peace, 2016). Within OECD nations, the incidence of terrorism-related fatalities registered an astonishing surge, exceeding 900%, during the period spanning from 2007 to 2019, as delineated by the research conducted by the Institute for Economics and Peace in 2016. Notably, this escalation was most pronounced in countries such as Turkey, France, the United States, and Belgium. This substantial rise in terrorism-related deaths

underscores the gravity of the challenge posed by terrorism within these regions and necessitates a comprehensive examination of the underlying factors driving such increases.

Pizam and Smith's research in 2000 unveiled a noteworthy pattern, wherein a substantial majority of terrorist incidents, approximately 79%, resulted in a marked downturn in tourism demand, lasting up to six months, half of them recovering three months. Conversely, an examination conducted by Kollias, Papadamou, and Stagiannis in 2011, investigating the repercussions of terrorism on the London and Athens stock markets, did not discern any conspicuous indications of a protracted adverse influence. This research underscores the significance of exploring variations in the impact of terrorism on diverse financial markets and emphasizes the potential resilience exhibited by certain stock markets in the face of such events. In 2016, Procasky and Ujah's study revealed that terrorism escalates government debt financing cost, especially in developing markets. A minor two-point rise in the terrorism index (refers to a composite measure or index that assesses and quantifies the level of terrorism or terrorist activities within a particular region, country, or globally) corresponded to an average one-notch downgrade in a country's sovereign credit rating, indicating terrorism's potential to significantly affect business capital costs (Procasky & Ujah, 2016). The Global Terrorism Index and the Terrorism Risk Index are examples of well-known indices that assess, and rank countries based on their vulnerability to terrorism. However, the impact on business performance varies depending on factors such as business type, location, and attack severity.

Essaddam and Karagianis (2014) observed that firms in wealthier or more democratic nations tend to experience higher stock return volatility compared to those in developing countries. In contrast, Llorca-Vivero (2008) found that the adverse effects of terrorism are more severe in developing nations. These studies suggest that, in developed countries, where economic conditions are generally more stable, firms may face greater fluctuations in stock returns. Conversely, in developing countries, the impact of terrorism on firms appears to be more pronounced, potentially due to factors such as weaker institutional structures and limited resources for coping with disruptions. The combined insights highlight the nuanced dynamics of business experiences in developed and developing nations, offering implications for discussions on global economic disparities and strategies for mitigating risks in diverse geopolitical contexts. Additionally, the fear of terrorism can hinder investment and business growth, as noted by Becker and Rubinstein (2011), who argue that it increases uncertainty in the business environment, negatively affecting consumer behavior and investment decisions (Drakos, 2010).

Enders and Sandler (2011) argue that terrorism's immediate economic costs are localized, leading to a shift in economic activity from vulnerable to resilient sectors, benefiting large firms. Greenbaum, Dugan, and LaFree (2007) find that consumer choices are influenced by the risk of terrorist attacks. Additionally, terrorism raises business costs through increased wages and security spending.

Brodeur (2018) argued that the emotional impact and increased security costs due to the risk of future terrorist attacks negatively affect business survival and growth. Additional expenses like security, surveillance, and property replacement further strain financial resources, leading to adverse business performance (Fernandez, 2008).

These findings indicate that highly affected countries with effective recovery mechanisms provide investors with a sense of assurance regarding the timely resolution of situations involving terrorism-related incidents, leading to less harm to returns during events like assassinations, armed assaults, and hostage-taking. Governments in highly affected nations should consider policies aimed at mitigating terrorism risks through improved intelligence and regulatory enforcement. Enhanced intelligence can significantly reduce terrorist incidents, fostering peace and investor confidence. Additionally, it's worth exploring how events like political and financial news releases, as well as annual budget announcements, can affect stock market returns alongside terrorism-related factors in future studies.

1.4 History regarding the IBEX35, FTSE100 and CAC40

Insurance companies fulfill a crucial economic function by offering risk protection to financial entities, enterprises, and individuals. They serve as intermediaries for risk management through methods such as diversification and risk pooling, alongside various complementary strategies (Insurance Core Principles, 2015). In essence, their core operational objective revolves around the profitable provision of insurance against a spectrum of risks.

Profitability constitutes a cornerstone for the effective, equitable, secure, and stable functioning of insurance markets, ultimately benefiting and safeguarding policyholders (Burca and Batrînca, 2014). As asserted by Burca and Batrînca (2014), profitability serves as a magnet for investors, bolstering solvency and, subsequently, enhancing consumer trust. Moreover, it assumes a pivotal role in incentivizing both policyholders and shareholders to allocate resources to insurance enterprises. Consequently, a paramount objective of insurance company management is the attainment of profitability, deemed an indispensable prerequisite for engaging in any facet of insurance operations (Chang, Lee, & Chang, 2014). The financial performance of insurance companies holds significance within the broader macroeconomic landscape, given their substantial contributions and roles in fostering the advancement of economic and financial systems (Chang, Lee, & Chang, 2014).

Madrid Stock Exchange (IBEX35) has played a pivotal role in Spanish history, alternating long periods of economic prosperity with periods of crisis and decline, but always acting as a reliable barometer of the country's economic trends. The stock market remains the primary source of financing for companies. All members of the Madrid Stock Exchange must pay an annual fixed fee of €2,900 plus 0.001% of the total cash value traded (the sum of sales and purchases) during the year. These dues are billed quarterly. According to BME market report from 2020, in 2020, the Spanish Stock Exchange witnessed substantial losses in the realm

of large-cap stocks, notably evidenced by the IBEX35 index's decline of 15.45% (BME, 2020). While dividends offered a partial buffer, the final downturn still amounted to 12.7%. Notably, the predominant presence of banking and tourism sectors within the index acted as a deterrent, causing its performance to lag behind other global benchmarks. By the close of November 2020, bank stocks in the IBEX35 had plunged by 27.35%, whereas energy stocks exhibited a relatively modest decline of 4.2% (BME, 2020). In contrast, the leisure, tourism, and hospitality sub-sector index bore the brunt of the economic turmoil, recording a staggering drop of over 30%. Remarkably, smaller company indices outperformed the broader market during this period (BME, 2020). The IBEX Small Cap index, comprising 30 companies, surged by 18.9%. Notably, the two indices within the Bolsas y Mercados Españoles (BME) Growth platform, catering to growth-focused firms, exhibited even more impressive gains: the IBEX Growth All Share climbed by 39.6%, and the IBEX Growth 15 surged by 54.1% (BME, 2020). These disparities in performance can be attributed to the differing sectoral compositions of companies constituting these indices, with smaller indices demonstrating resilience due to their reduced exposure to the banking and tourism sectors (Buesa, Valino, Heijs, Baumert, & Gomez, 2006).

The Financial Times Stock Exchange 100 Index (FTSE 100) serves as a benchmark stock market index designed to monitor the performance of the 100 most substantial enterprises listed on the London Stock Exchange, as determined by their market capitalization. Oversight and management of this index are entrusted to FTSE Group, a wholly owned subsidiary operating under the auspices of the London Stock Exchange. Notably, key participants in the London Market encompass insurance and reinsurance entities, syndicates associated with Lloyd's of London, Marine Protection and Indemnity Clubs (P&I Clubs), as well as brokerage firms (Kollias, Papadamou, & Stagiannis, 2011). The central focal point of the London Market revolves around the facilitation of globally traded insurance and reinsurance operations, predominantly encompassing non-life insurance and reinsurance segments, notably within the domains of marine and aviation insurance (Bloomberg L.P). This sector exhibits a growing emphasis on managing high-exposure risks, indicative of its evolving dynamics and strategic orientations within the industry (Bloomberg L.P).

The CAC40, also known as Cotation Assistée en Continu, represents the top 40 companies listed on Euronext Paris, with their weight determined by market capitalization (Bloomberg L.P). France boasts a robust insurance sector, ranking fifth globally and second in Europe, with a revenue of €293 bilion in 2017 and a roster of over 285 insurance firms (Insurance in France: The Complete Guide for Expats | Expatica, n.d.). Regulatory oversight is provided by the Banque de France through the Autorité de Contrôle Prudentiel et de Résolution, and a significant number of insurers are affiliated with the French Insurance Federation (Insurance in France: The Complete Guide for Expats | Expatica, n.d.). French residents are obligated to acquire specific insurance types, while additional optional coverage is offered by banks and supermarkets. Key players in the French insurance industry include

Homebrella, Allianz, Lemonade, AXA, GMF, and Luko (Insurance in France: The Complete Guide for Expats | Expatica, n.d.).

1.5 The influence of terrorism on stock markets

Although the ramifications of terrorism extend across all sectors of the economy, the stock market appears to be particularly susceptible to its repercussions. The behavior of stock market returns has been meticulously examined through a conditional volatility framework, revealing compelling evidence that terrorist incidents and geopolitical tensions disrupt investor sentiment (Shaikh, 2018). The market's reaction to terrorist attacks, factoring in variables like the target, location, number of perpetrators, and property valuation, exerts a substantial influence on stock market dynamics, typically, the stock market registers a negative response on the day of the attack and maintains instability over subsequent days (Shaikh, 2018). Findings from Shaikh in 2018 also suggest that market participants take into account the characteristics of terrorist incidents when shaping their portfolio and long-term investment strategies. Numerous scholars, such as Chen and Siems (2004), Ciferri (2008), and Spagnolo (2008), have delved into the adverse impact of terrorism on the stock market. Their studies reveal a significant decline in abnormal returns and cumulative abnormal returns in the aftermath of terrorist attacks. Furthermore, it is evident that terrorism exerts a detrimental effect on long-term stock market returns, though the relationship between terrorism and short-term stock market performance remains statistically insignificant. Chen and Siems (2004) discern discrepancies in the extent of the adverse impact of terrorist activities across different markets. Additionally, while terrorism plays a pivotal role, it's important to acknowledge that various stochastic factors may also contribute to adverse stock market performance, although these have not been comprehensively addressed in all studies.

Spagnolo (2008) proposed policy measures aimed at fostering institutional development, encouraging investment in the burgeoning security industry, and cultivating a conducive environment for investors. These measures encompass adjustments to the money supply and interest rates. Furthermore, Spagnolo (2008) conducted a comprehensive analysis of the complexities, obstacles, and strategies in addressing the threats posed by terrorism to stock prices. His research amalgamates empirical findings with an institutional vantage point, shedding light on regulatory hurdles associated with the counteraction of terrorist financing.

1.6 Objective and goals of the study

The primary aim of the research is to examine the influence of terrorist attacks on the stock performance of insurance firms within the European Union during the period from 2004 to 2018. This master's thesis is relevant to potential investors in insurance company stocks and to stockholders as well. Through analytical research, this thesis will examine the determinants of stock performance of insurance companies and their reaction and correlation

to the terrorist attacks in Madrid 2004, London 2005, and Paris 2015. My findings suggest that the most dominant potential factors affecting them are the type of capital market, the arrival of new information or news of terrorist attacks, and the impact of cognitive and emotional biases caused by behavioral finance.

2 LITERATURE OVERVIEW

This section undertakes a comprehensive examination of the pertinent theoretical and empirical literature concerning the influence of terrorist attacks on the performance of insurance company stocks. Subsequently, the connection between these two strands of literature will be explored, and any existing gaps within the current body of research will be identified.

2.1 The efficient market hypothesis

The efficient market hypothesis (hereinafter: EMH), a pivotal concept in finance since the early 1970s, remains one of the most contentious and extensively examined hypotheses in the realm of social sciences. Despite advancements in data quality, quantity, statistical methodologies, and theoretical frameworks, financial economists have not reached a definitive consensus regarding the authenticity of the EMH. For instance, as highlighted by Sewell (2011), a review of research papers showed that slightly less than half of them provided support for market efficiency.

The notion of capital markets operating efficiently, wherein stock prices comprehensively reflect all accessible information, had its origins in the 1960s when the prevailing sentiment in academic research endorsed this concept. The foundations of this idea can be traced back to the seminal works of Fama (1965) and Samuelson (1965). Nevertheless, as subsequent decades unfolded, an increasing number of studies emerged that cast doubt on the hypothesis across its three distinct forms: weak, semi-strong, and strong efficiency (Fama, 1970). In 1970, Eugene Fama contributed significantly to the discourse by providing a comprehensive definition of efficient markets and delineating the boundaries of these three forms of efficiency. In his definition, an efficient market is characterized by "a market with a great number of rational, profit-maximizing participants who actively compete, each striving to predict the future market values of individual securities, and where current, significant information is readily available to all participants" (Fama, Fisher, Jensen & Roll, 1969). This foundational work laid the groundwork for subsequent discussions and explorations in the field of financial economics.

An efficient capital market is one characterized by the phenomenon where asset prices completely incorporate all known information, rendering it such that uninformed investors who acquire diversified portfolios at the prevailing market prices can attain returns on par

with those achieved by experts (Malkiel, 2003). The weak form of the EMH asserts that stock prices encapsulate all historical data, encompassing aspects like past prices and trading volume. Consequently, investors are unable to accrue abnormal profits from investing in these financial instruments. In this scenario, the EMH suggests that prices exhibit a random walk (Fama, 1970). Transitioning to the semi-strong form of the EMH, it postulates that asset prices not only encompass all publicly available data, including historical information (thus encompassing the weak form) but also incorporate new public information instantaneously and impartiall (Fama, 1970). In a market governed by the semi-strong form of the EMH, neither technical nor fundamental analyses can guide investors in outperforming a random portfolio of financial assets (Samitas, 2004). Finally, the strong form of the EMH extends its reach to assume that asset prices integrate all accessible information about a market, spanning historical financial data (from the weak form), all newly introduced public information (from the semi-strong form), and even confidential information specific to a financial asset.

According to Fama (1970), the EMH posits that stock prices are impervious to prediction based on historical data such as past prices and trading volume which stems from the assertion that all historical information is instantaneously integrated into current stock prices, leading to a pattern of randomness. Thaler (1999) elucidates that the foundation of the random walk theory lies in the notion that the flow of information encounters no hindrance, with this information promptly reflected in stock prices. Consequently, future price fluctuations are autonomous, carrying no dependence on preceding changes in prices. This autonomy arises from the unpredictable nature of news, thus rendering ensuing price alterations inherently unpredictable and following a random trajectory. Furthermore, the EMH asserts that asset prices comprehensively encapsulate all available knowledge, facilitating even uninformed investors who purchase diversified portfolios at prevailing market rates to secure returns equivalent to those achieved by experts. Nevertheless, as the 21st century commenced, the EMH encountered diminishing consensus (Malkiel, 2003). Many financial scholars and statisticians began to entertain the idea that asset prices might possess at least partial predictability (Malkiel, 2003). A subsequent generation of economists accentuated the psychological and behavioral facets of asset price determination, suggesting that future asset prices may be moderately forecasted by examining past price patterns and specific "fundamental" valuation metrics (Malkiel, 2003). In fact, some of these economists ventured into more contentious territory by contending that these predictable patterns have the potential to enable investors to amass excess risk-adjusted returns (Gemmill & Thomas, 2002).

Many financial economists and statistician delved into the issues surrounding the EMH and the contention that stock prices may possess some degree of predictability and the assertion is put forth that markets can maintain efficiency despite the presence of irrational market participants and stock prices displaying heightened volatility that transcends explanations grounded in fundamental factors like earnings and dividends (Malkiel, 2003). Their findings

posit that financial markets achieve efficiency by virtue of their resistance to enabling investors to secure returns that surpass the norm when adjusted for risk.

The studies argues that behavioral finance and the EMH are not mutually exclusive, but rather complementary. While behavioral finance highlights the psychological and behavioral biases that can lead to market inefficiencies, the EMH provides a framework for understanding how markets function and how prices are formed. In short, behavioral finance can help us to better understand the EMH and how it applies in the real world.

2.2 Behavioral finance theory

Behavioral finance uses less restrictive models than traditional finance to study financial markets, considering human psychology and behavior. Specifically, behavioral finance integrates insights from cognitive psychology and economics to explain how investors' behavior and biases can lead to market inefficiencies. Cognitive psychology is a field dedicated to exploring human thought processes, and it encompasses a substantial body of research that catalogues consistent errors in human judgment and the decision-making process (Bem, 1967). For example, people tend to be overconfident, overweight recent experience, and have preferences that can lead to distortions (Statman, 1999). Behavioral finance models incorporate these insights to account for the fact that some investors are not fully rational. Contemporary finance is founded on the EMH, which posits that market competition leads prices to their accurate valuations. While the EMH doesn't require all investors to be rational, it does assert that markets exhibit rationality by providing unbiased predictions of the future (Fama, 1965). Conversely, behavioral finance contends that financial markets may display informational inefficiency under certain conditions.

In recent years, there has been a shift in academic finance research, moving away from traditional econometric analyses of time series data related to prices, dividends, and earnings (Shiller, 2003). Instead, researchers have increasingly turned their attention toward developing psychological models that delve into human behavior which led to the emergence of the field of behavioral finance (Shiller, 2003). One of the oldest theories about financial markets, which has been popularized in newspapers and magazines but has received less attention in scholarly journals, is a price-to-price feedback theory (Statman, 1999). This theory suggests that when speculative prices start to increase and certain investors begin to profit, it captures the public's attention, creating excitement and raising expectations of even higher price gains. As a result, more investors are drawn to the asset, causing prices to surge further. This cycle can persist until a bubble forms, and it typically bursts when these elevated expectations are not realized.

According to Shiller (2003), as asset prices rise, there is an increased demand from investors, further boosting prices. This cycle can persist until prices reach unsustainable levels, creating a speculative bubble driven primarily by expectations of continuous price growth. The

eventual bursting of the bubble can be abrupt and unrelated to fundamental news. Conversely, when asset prices start to decline, more investors look to sell, intensifying the downward pressure on prices. This negative sentiment in the market, characterized by pessimism and the expectation of further price declines, can exacerbate the selling pressure, leading to even lower prices (Shiller, 2003). Negative bubbles, characterized by declining asset prices, can be as detrimental to investors as positive bubbles, and they are often challenging to anticipate. It is essential for investors to recognize the potential for both positive and negative bubbles and implement effective risk management strategies to safeguard their investments. Additionally, the concept of biased self-attribution, as outlined by psychologist Daryl Bem (1967), plays a role in how individuals perceive events related to their actions. They tend to attribute events that validate their abilities to their own skill and attribute events that contradict their actions to factors like bad luck or external interference. His research revealed cognitive biases affecting investor decisions and financial outcomes.

The study of behavioral finance theory carries significant implications for comprehending and predicting market dynamics, alongside the potential to craft more effective investment strategies and financial instruments that can accommodate the inherent cognitive biases of investors (Shleifer and Vishny, 1997). The foundation of this theory rests upon two pivotal premises: the existence of behavioral biases among certain segments of investors and the constraints imposed by the arbitrage mechanism. Within conventional financial theory, it is posited that if some investors exhibit irrational behavior, leading to the mispricing of assets, rational investors (commonly referred to as arbitrageurs) will swiftly exploit these mispricings (Shleifer and Vishny, 1997). This would subsequently result in the restoration of fair asset values through their trading activities. However, behavioral finance theory counters this perspective by asserting that mispricing can persist due to the associated risks and costs associated with the arbitrage process. These factors, in turn, limit the propensity of arbitrageurs to actively engage in trades aimed at rectifying these mispricings (Shleifer and Vishny, 1997). In the prevailing academic discourse, behavioral finance is often presented in contrast to traditional rational finance. It underscores the divergence in investor behavior from the fundamental assumptions of rational choice theory. Nevertheless, a cohort of scholars, represented by figures such as Statman (1999) and Thaler (1999), espouses the integration of behavioral finance into the framework of traditional finance theory. They advocate for a unified approach in which all financial theories incorporate assumptions regarding investor behavior, striving to amalgamate empirically observed behavior into models rather than delineating a discrete subset of models solely grounded in observed behavior.

From this section, we can conclude that behavioral finance has made significant progress in recent years, it is not yet widely incorporated into financial models.

2.2.1 The limits to arbitrage

An essential contention within the realm of behavioral finance posits that the presence of behavioral biases among investors, often referred to as noise traders, can exert a persistent influence on asset prices and returns. However, for this impact to endure, it necessitates the coexistence of constraints on arbitrage that hinder rational investors from effectively capitalizing on short-term misvaluations and restoring prices to their equilibrium levels (Mitchell, Pulvino, and Stafford, 2002). Limits to arbitrage can arise for a variety of reasons, such as:

- Transaction costs: It can be costly to trade assets, especially when short-selling.
- Information costs: It can be costly to obtain information about asset prices and values.
- Liquidity constraints: It may be difficult to trade assets that are in high demand or low supply.
- Behavioral biases: Rational investors may be reluctant to trade against noise traders, fearing that they will be on the wrong side of the market.

Mitchell, Pulvino, and Stafford (2002) verified 82 cases in which the market value of a company was lower than the value of its ownership stake in another publicly traded company. These cases represent obvious and straightforward mispricing situations, yet the authors find that the mispricings persisted for some time. This suggests that there are barriers to arbitrage that prevent rational investors from exploiting these opportunities. The existence of limits to arbitrage is important for behavioral finance because it allows behavioral biases to have a sustained impact on asset prices and returns. If there were no limits to arbitrage, rational investors would quickly exploit any mispricings, driving prices back to equilibrium values.

Barberis and Thaler (2002) have delineated various factors that impede arbitrage activities. One of these factors is the absence of a suitable substitute for the mispriced asset, which exposes arbitrageurs to fundamental risk - the risk associated with adverse alterations in the asset's underlying fundamentals. Even in cases where a close substitute exists, arbitrageurs confront noise trader risk, denoting the risk that uninformed investors may exacerbate the mispricing before its correction (Barberis and Thaler, 2002). This can render it arduous for arbitrageurs to uphold their positions, particularly when engaged in leveraged trading or utilizing external capital. Additionally, implementing arbitrage trades can incur substantial costs, and shorting an overpriced security may be infeasible under circumstances where stock lending is prohibited, or shares are unavailable for borrowing. These multifaceted challenges in arbitrage can significantly hinder the correction of mispricings in financial markets.

Lamont and Thaler (2003) discovered cases where a tech company's subsidiary, after being spun off, had a higher market value than the parent company that still held a majority of its shares. Short-selling the spinout frequently presented formidable challenges, high costs, or

insurmountable barriers, thereby reducing or nullifying potential arbitrage opportunities. This highlights the practical obstacles encountered by arbitrageurs in spinoff situations.

2.2.2 Behavioral asset pricing

Statman (1999) notes that a key area of behavioral research is the extent to which investor emotion affects stock returns, which most practitioners consider self-evident. However, traditional finance theory assigns limited significance for sensibility in asset pricing.

Research in behavioral finance (Baker and Wurgler 2006; Kumar and Lee 2006; Tetlock 2007) has revealed that investor sentimentalism exerts an influence on stock returns, with the most significant impact observed in the case of stocks that are challenging to assess or arbitrage, including minor stocks, newly established stocks, unprofitable stocks, and highly volatile growth stocks (Baker & Wurgler 2006; Kumar & Lee 2006; Tetlock 2007). When investors are optimistic, stocks that are difficult to value or arbitrage tend to underperform in the future. When investors are pessimistic, these stocks tend to outperform.
Hirshleifer and Shumway (2003) discovered that daily stock returns across global markets can be influenced by the weather conditions in the city where the country's primary stock exchange is located. Nevertheless, capitalizing on this predictability in returns would necessitate frequent trading, and the associated trading costs would probably offset any potential profits for the majority of investors (Hirshleifer and Shumway, 2003).

Kamstra, Kramer, and Levi (2003) uncovered comparable evidence indicating that returns in multiple countries during different times of the year correlate with the duration of daylight, potentially influenced by seasonal affective disorder. This implies that investor sentiment can exert a noteworthy influence on financial markets.

Gemmill and Thomas (2002) illustrate that shifts in retail investor fund flows, serving as a proxy for sentiment among noise traders, result in variations in the discount of closed-end funds. Crucially, Clarke and Statman (1998) discovered that the present opinions voiced by investment newsletter writers do not forecast returns.

In the realm of financial research, various behavioral models have been formulated to elucidate empirical observations. For instance, Barberis, Shleifer, and Vishny (1998) highlight the presence of conservatism bias and the use of the representativeness heuristic (cognitive bias whereby individuals gauge the likelihood of an event or situation based on surface-level attributes and resemblances to prior experiences, rather than considering the intrinsic likelihood) among investors. This tendency can lead to overreactions in financial markets, as investors may discern patterns in random data and extend a company's recent positive earnings announcements further into the future than warranted (Barberis, Shleifer, & Vishny, 1998). For instance, investors might assume that shares of a "promising company"

will invariably be a lucrative investment, even though this assumption may not consistently hold true.

Shefrin and Statman (1995) discovered that respondents in surveys tend to view companies with strong reputations, as assessed by Fortune magazine's yearly corporate reputation survey, as favorable investment options. Nevertheless, their research also indicated that these companies are often large in size and exhibit low book-to-market ratios, characteristics that prior studies have associated with lower returns in subsequent periods. Recent investigations into this matter have yielded diverse outcomes.

Cooper, Dimitrov, and Rau (2001) discovered that investors often make investment decisions based on a company's name, even if it's unrelated to the company's performance. This behavior, rooted in a cognitive bias, leads investors to overvalue companies with names associated with positive traits, like adding ".com." They studied 95 companies that appended ".com" to their names in 1998 and 1999. The analysis revealed these companies experienced significant positive abnormal returns in the ten days after the name change, persisting for at least 120 trading days, implies irrational decision-making based on the representativeness heuristic rather than fundamentals (Cooper, Dimitrov & Rau, 2001). The perspective of rational managers and irrational investors carries important consequences for corporate financial structures and the timing of securities issuance. Managers might be inclined to select misleading names, which could result in market inefficiencies and losses for investors.

Baker and Wurgler (2000) note that companies tend to increase their equity issuances in relation to debt offerings before periods of sluggish equity market performance. This implies that companies strategically schedule their equity issuances to take advantage of favorable investor sentiment and potential market mispricing. Moreover, this discovery suggests that a firm's capital structure is frequently shaped by past attempts to opportunistically time the equity market, rather than following a predetermined target structure (Baker and Wurgler, 2002). Additionally, Baker and Wurgler (2004) propose that dividend policies may be influenced by managers responding to investor preferences. Managers may rationally adjust their dividend decisions based on whether investors currently favor dividend-paying or non-dividend-paying firms.

Shleifer and Vishny (2003) propose a behavioral model of mergers and acquisitions (hereinafter: M&As) to explain the underlying motivations for these transactions. The model is based on the assumption that stock prices are mispriced and that managers are aware of and respond to these mispricings (Shleifer & Vishny, 2003). The authors contend that decisions regarding mergers and acquisitions (M&A) and the selection of financing methods are influenced by the relative valuations of the companies involved. For instance, when valuations are elevated, it is more probable that acquisitions will be funded using stock.

The model also suggests that acquisitions for stock are typically made by overvalued firms and that target firms are typically less overvalued. This is because overvalued firms have more stock to offer and target firms are less likely to want to be paid in overvalued stock.

The model proposed by Shleifer and Vishny (2003) is capable of elucidating numerous observed features of the M&A market, including the following:

- Acquisitions are more likely to be financed with stock when stock prices are high.
- Overvalued firms are more likely to be acquirers.
- Target firms are typically less overvalued than acquirers.
- Acquisitions for stock tend to underperform relative to acquisitions for cash.

Behavioral finance offers valuable perspectives on the initial public offerings (IPO) market, characterized by the common occurrence of underpricing at the offering stage, leading to substantial first-day returns (Loughran & Ritter, 2002). One intriguing aspect of IPOs is the willingness of issuers and pre-IPO shareholders to embrace this phenomenon known as "money left on the table." In their work, Loughran and Ritter (2002) introduce a model grounded in prospect theory. Within this framework, issuers are inclined to assess the net impact of the money left on the table due to IPO underpricing alongside the wealth gain resulting from subsequent share price appreciation.

Camerer, Loewenstein, and Prelec (2005) investigated neuroeconomics as a burgeoning field that delves into the intricacies of how our brains engage in decision-making within the realms of economics and markets. Employing brain imaging and other neuroscientific methodologies, researchers gain valuable insights into how the brain reacts to diverse situations and choices. Camerer, Loewenstein, and Prelec (2005) present an extensive examination of neuroeconomics' literature. A notable insight from neuroscience is the distinction between different types of brain processes, including those that are controlled versus automatic and cognitive versus affective in nature. In practical terms, individuals frequently make decisions through a rapid, intuitive process that may be influenced by cognitive shortcuts and biases. Alternatively, they may opt for a more deliberate, thoughtful approach that takes emotional factors into account.

2.3 Signaling theory

Signaling theory, a microeconomic framework introduced by Spence in 1973, elucidates the process of conveying private information by individuals or organizations in situations characterized by information asymmetry. In this context, the sender of a signal possesses knowledge unavailable to the receiver and faces the critical decision of whether and how to transmit this information (Spence, 1973). Conversely, the receiver confronts the task of deciphering the meaning behind the signal. Signaling theory finds application across various domains of management research, including strategic management, entrepreneurship, and

human resource management. For instance, it aids in understanding how firms communicate their quality to investors, how entrepreneurs demonstrate their competence to venture capitalists, and how employers convey their commitment to employees (Spence, 1973). Despite the growing utilization of signaling theory in management studies, there exists a demand for greater precision and clarity in its application. In response to this need, the authors of this passage offer a concise synthesis of signaling theory, expound upon its fundamental principles, evaluate its utilization in the management literature, and propose avenues for future research (Spence, 1973).

Signaling theory has found application in elucidating various executive and organizational behaviors, encompassing diversification strategies, resource signaling, and board composition. For instance, Goranova et al. (2007) observed that senior executives augment their ownership stakes within their companies to communicate to capital markets that diversification strategies align with the best interests of shareholders. In another context, Cable, and Turban (2003) revealed that college football coaches employ HummerTM limousines adorned with the logo of the school during visits to local high schools, serving as a signal of a resource-abundant environment to potential candidates.

Management scholars have applied signaling theory across a wide spectrum of research areas to elucidate the impact of information asymmetry. In a different scenario, Miller and Triana (2009) utilized signaling theory to clarify how organizations utilize heterogeneous boards to express their dedication to societal values to various stakeholders.

Signaling theory suggests that a signal cannot distinguish between two applicants unless the cost of signaling is lower for more productive applicants (Spence, 1973). For instance, the value of a university degree as a signal has diminished due to its widespread pursuit, resulting in challenges for employers in distinguishing qualified from unqualified applicants. However, an equilibrium is reached when employers successfully interpret the signals from applicants, resulting in a set of employer beliefs that shape wage structures, signaling choices by applicants, hiring outcomes, and new market data, all consistent with the initial beliefs (Spence, 1973).

According to Spence (1973), signaling theory posits that equilibrium in the hiring process is reached through repeated rounds of interviewing, where employers' beliefs about the correlation between signals and productive ability are updated based on the outcomes of previous hiring decisions. For signaling to be effective, there must be an adequate quantity of signals within the acceptable cost range, and the cost of sending a signal must be negatively correlated with productive ability (Spence, 1973). However, if the signal cost is deficent relative to its value, it becomes ineffective. For example, in recent years, the cost of obtaining a college degree has decreased, while the signaling value of a college degree has remained relatively constant. This has led to a decrease in the effectiveness of a college degree as a signal of productive ability. In addition to signals, employers also use indices,

such as grades and test scores, to make hiring decisions. However, indices are not perfect measures of productive ability, and they can be biased against certain groups of people (Spence, 1973).

Signaling theory, initially proposed by Spence (1973), has been foundational to many subsequent hypotheses, models, theories, and ideas across a diverse range of disciplines, including management, industrial-organizational psychology, and science (see Table 1).

Table 1: Examples of the Impact of Signaling Theory on Management, Psychology, and Anthropology

Affected Field	Seminal Article	Construct Signaled	Signal
Management			
Careers	Rosenbaum (1979)	Career Mobility	Early Career Path
	Forbes (1987)	Promotability	Prior Promotions Background Prior Jobs
Strategy	Marcus & Goodman (1991)	Crisis Management	Crisis Communication
	Certo (2003)	IPO Future Success	Financial Reports
	Ross (1977) Bhattacharrya (1979)	Quality	Debt Dividends
Recruiting	Chapman, et al (2005) Ehrhart & Ziegert (2005)	Organizational Fit	Recruiter Behaviors Recruitment Activities
Psychology			
Consumer Psychology	Boulding & Kirmani (1993)	Product Superiority	Warranty
	Kirmani (1990)	Product Position	Advertising
	Davis (1991)	Product Quality	Brand Names
Anthropology	Bird & Smith (2005)	Generosity, Wastefulness	Communication Patterns
	Sois & Bressler (2003)	Religious Practices	Various Selective Pressures

Source: Perkins & Hendry (2005).

Signaling theory has found application in a diverse array of research topics within the field of management. Rosenbaum (1979) applied signaling theory to explain the tournament pattern of employee mobility. In his study, Rosenbaum (1979) aimed to examine the career progression patterns of a group of employees and test the tournament model's suggested relationships. It's important to note that his research was descriptive rather than causal, focusing on whether early career paths were correlated with later career mobility. This investigation sought to identify instances of social signaling, as discussed by Spence (1973).

Signaling theory has gained prominence in recruitment research. As Spence (1973) emphasized, the effectiveness of a signal hinges on its ability to differentiate signalers from others. Chapman, Uggerslev, and Carroll (2005) conducted an investigation into the various aspects of signaling in recruitment, encompassing outcomes, predictors, and moderators. These moderators align with Spence's concept of indices, while the predictors are akin to the true signals to recruits. To gain deeper insights, it is essential to focus on the indicators, acting as signals for potential recruits, encompass job and company attributes, recruiter traits,

perceptions of the recruitment process, perceived compatibility, available alternatives, and hiring anticipation (Chapman, Uggerslev & Carroll, 2005).

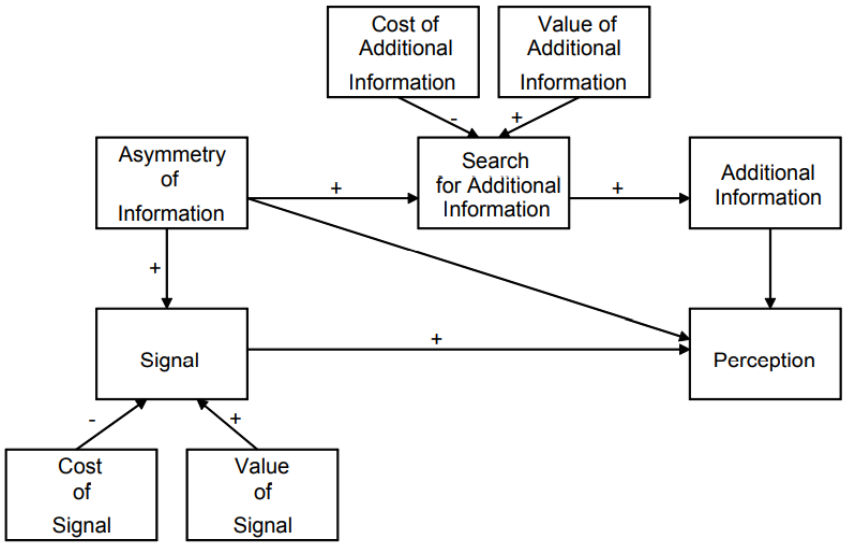
Turban and Keon (1993) identified several organizational characteristics that can signal important information to recruits, including reward structure, centralization, size, and geographical dispersion. For example, skill diversity can indicate to a prospective recruit that the job will provide diverse learning opportunities (Turban and Keon, 1993). When combined with autonomy, it can suggest that the recruit will have the freedom to acquire extensive knowledge in the role. Furthermore, organizational attributes like a robust reward system and substantial size can signal that there is potential for career progression and recognition for excellent performance.

Ehrhart and Ziegert (2005) applied signaling theory to recruitment, focusing on attraction theories, such as individual environmental processing, fit-related interactionist processing, and self-processing centered on personal characteristics. Signaling theory, rooted in social psychology, and involving attitudes and characteristics, aligns with the self-processing meta-theory, which is pertinent for explaining the connection between subjective fit and attraction to the signal (Ehrhart and Ziegert, 2005).

Self-processing theories encompass social learning theory, consistency theory, and social identity theory. For instance, social learning theory suggests that behavior is influenced by vicarious learning, where observers develop outcome expectancies (Bandura, 1986). In the context of unethical recruitment practices, this suggests that individuals may learn to engage in such practices by observing others doing so, and by forming expectations about the positive outcomes of such behavior. Consistency theory suggests that self-esteem plays a crucial role in career decisions, meaning that individuals with high self-esteem see themselves as "need-satisfying," whereas those with low self-esteem see themselves as "norm-satisfying." This implies that signals from recruiters are more likely to catch the attention of individuals with high self-esteem, enhancing the signal's negative impact, which is essential for its effectiveness in recruitment (Saks & Ashforth, 1997).

Figure 1 illustrates the intricate dynamics of signaling, information, and perception through a conceptual model. This model provides a visual representation of the complex relationships that exist among these key components in the context of various interactions. By examining the interplay between information, signaling, and perceptions, the figure aims to elucidate the nuanced and dynamic nature of how entities communicate and are perceived within a given system. The conceptual model serves as a framework for understanding the multifaceted processes through which information is conveyed, signals are interpreted, and perceptions are formed, contributing to a comprehensive view of the communication and interpretation mechanisms at play.

Figure 1: The dynamics of signaling, information, and perception



Source: Perkins & Hendry (2005).

2.4 Determinants of stock performance

In this section, following Ho and Iyke (2017), we divide the literature on stock market development into theoretical and empirical strands. We then proceed to analyze these strands. Theoretical literature identifies two primary determinants of stock market development: macroeconomic and institutional factors. Macroeconomic factors, such as real income and economic growth, generally promote stock market development. However, factors like the banking sector, interest rates, and private capital flows have mixed effects. Inflation and exchange rates are typically detrimental. Institutional factors contributing positively to stock market development include legal origins, stock market integration, investor protection, corporate governance, financial liberalization, and trade openness (Ho & Iyke, 2017). Saiedi (2007) argues that policies aimed at enhancing institutional quality, financial integration, real income growth, macroeconomic stability, and capital inflows, among others, will promote stock market development within and across countries. While empirical investigations have encompassed an extensive array of variables within their analytical frameworks, theoretical inquiries have yet to cultivate comprehensive models elucidating the intricacies of stock market development.

Developing a theoretical model that incorporates a large set of determinants of stock market development may be challenging, but it is a worthwhile endeavor (Ho & Iyke, 2017). Such a model would unify the existing literature and stimulate further theoretical and empirical research on this important topic.

2.4.1 Return of equity vs. return of assets

The return on equity ratio (abbreviated as ROE) is a financial indicator that evaluates a company's effectiveness in resource management and its ability to generate profits for shareholders. This metric is computed by dividing the company's net income by its shareholders' equity, as outlined by Besley and Brigham in 2006. The ROE formula encapsulates this assessment:

$$\text{Return on equity} = \frac{Net\ Income}{Shareholders'Equity} \quad (1)$$

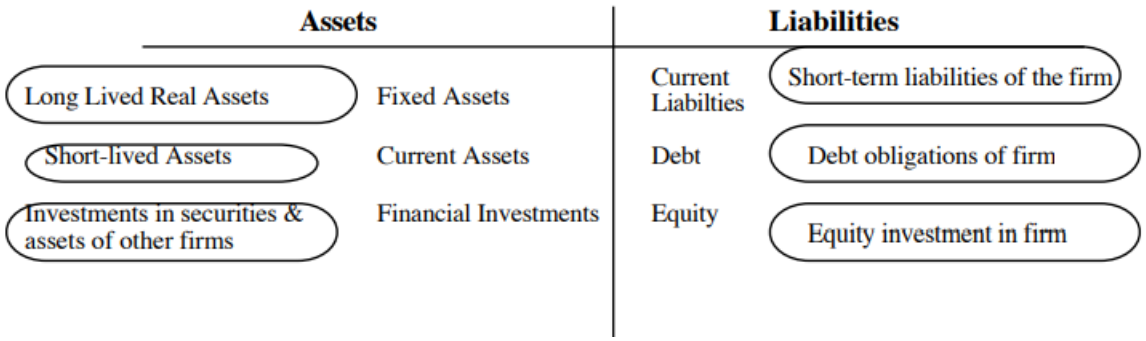
The assertion made by The Economic Times (2021) contends that the net income for the present fiscal year is inferred to originate from the equity investment initiated at the commencement of the year, with the book value of equity serving as the gauge for the equity allocated to extant assets.

ROE is a composite measure of the return on all of a firm's assets, including both cash and operating assets (Besley & Brigham, 2006). Because cash is very different from operating assets in terms of both risk and return, the ROE of firms with significant cash balances will be depressed by the low and riskless returns earned on cash (Besley & Brigham, 2006). Another complexity that can arise with the use of book value of equity is that some firms have negative book values. In such instances, the utility of ROE as a meaningful metric is compromised, and there may arise a imperative need to revert to the utilization of Return on Invested Capital (see figure 2). There are other measures of accounting returns, but most of them suffer from inconsistency problems that make them less useful for valuation and corporate finance purposes (Besley & Brigham, 2006). For example, some analysts use net income instead of after-tax operating income in the numerator when calculating return on capital (Besley & Brigham, 2006).

Return on assets (ROA) is a financial metric that assesses a company's ability to generate profits from its assets and it is calculated by dividing the company's net income by its total assets (Corporate Finance Institute, 2021). ROA is a key indicator of a company's ability to generate profits from its assets. A higher ROA indicates that a company is more efficiently utilizing its assets to generate profits and can be used to compare the performance of different companies within the same industry, or to track a company's performance over time (Corporate Finance Institute, 2021).

$$\text{Return on assets} = \frac{Net\ Income}{Total\ Assets} \quad (2)$$

Figure 2: Accounting balance sheet



Source: Corporate Finance Institute (2021)[1]

2.4.2 Earning per share vs. dividend per share

Ratio analysis is a financial tool that is used to measure the financial performance of companies (Baker, 2004). Ratios reveal important information about a company's operations and financial condition. Financial analysts use market ratios to analyze a company's financial situation. These ratios provide insights into a company's profitability, efficiency, and financial risk (Baker, 2004).

Earnings per share (EPS) is widely regarded as the most important factor in determining stock price and firm value (Saiedi, 2007). The literature shows that most individual investors make their investment decisions based on EPS. Market ratios, such as EPS, price-to-earnings ratio, dividend per share, dividend payout ratio, and dividend yield, are widely used for investment decisions and long-term planning (Saiedi, 2007).

Earnings per share (EPS) is a financial ratio that assesses a company's ability to generate profits for each share of its common stock, calculated by dividing the company's net income after taxes and preferred dividends by the weighted average number of common shares outstanding (Saiedi, 2007). EPS is a key indicator of a company's profitability and is widely used by investors to evaluate investment opportunities. Because the number of shares outstanding can fluctuate over time, a weighted average is typically used to calculate EPS which ensures that the EPS figure is accurately reflective of the company's profitability over the reporting period (Saiedi, 2007).

Earnings per share (EPS) holds considerable significance as a primary determinant of a stock's price, as emphasized by Besley and Brigham in 2006. Additionally, it serves as a key factor in the computation of the price-to-earnings (P/E) ratio, a prevalent valuation metric among investors. The importance lies in EPS being a measure of profitability per share, and variations in the number of shares outstanding can impact this profitability. To illustrate,

[1] Total Assets = Debt + Equity + Current Liabilities

consider a company with a net income of $31 million and preferred dividend payments of $1 million. The company has 10 million shares outstanding for the first half of the year and 14 million shares outstanding for the second half. Calculating EPS involves deducting preferred dividends to yield $30 million in net income, obtaining a weighted average of shares outstanding (12 million shares), and finally dividing net income by the weighted average to yield an EPS of $2.5. EPS can be assessed over different time periods, such as past, current, or projected earnings, to evaluate profitability. While EPS is commonly used for this purpose, it's essential to note that earnings may be subject to manipulation through accounting changes. Consequently, some analysts prefer utilizing free cash flow as a more dependable indicator of profitability than EPS, as highlighted by Besley and Brigham in 2006.

Dividend per share (DPS) is another metric used to assess dividend policy. Research suggests that managers tend to focus on maintaining a constant DPS, regardless of the availability of distributable earnings (Besley & Brigham, 2006). DPS reflects a company's ability to distribute some of its profits to shareholders, given the number of shareholders. Increases in debt reduce net income available for distribution to shareholders, and therefore reduce DPS (Besley & Brigham, 2006). To some extent, changes in DPS can be influenced by a company's corporate strategy. Other factors being equal, DPS is a reasonable measure of firm performance, except in the case of a recapitalization strategy that replaces equity with debt, which reduces the number of shares outstanding and therefore increases DPS (Besley & Brigham, 2006).

2.4.3 Internal rate of return

Capital budgeting is a financial management process that companies use to evaluate long-term investment opportunities and select the ones that are expected to maximize shareholder wealth (Gitman, 2009). It is a complex undertaking, especially in times of economic uncertainty. There are four main capital budgeting methods that are commonly described in finance textbooks: the payback period method, the profitability index, the net present value (NPV) method, and the internal rate of return (IRR) method (Gitman, 2009). The payback method and profitability index are generally considered to be less sophisticated than the NPV and IRR methods (Gitman, 2009). The IRR is compared to the cost of capital, which is the required rate of return on an investment. If the IRR is greater than the cost of capital, then the project is considered to be a good investment (Gitman, 2009). The cost of capital depends on how the funds will be used, rather than how they are acquired. The stock market is largely influenced by financial data and accounting information. The IRR based on cash recycling affects abnormal returns. Bath (2014) suggested that investors and creditors should consider the IRR based on cash recycling when making decisions, as it is informative and relevant to economic decisions. Bath (2014) also suggested that organizations should implement appropriate structures and mechanisms to monitor and control the performance of

companies, due to the lack of efficient and effective regulatory and supervisory systems in stock markets, which can be abused by some participants.

2.5 Empirical studies

Terrorist attacks, constituting unanticipated external disruptions, engender an atmosphere of heightened uncertainty. They engender a multitude of inquiries, encompassing inquiries concerning the identity of the perpetrators, the underlying motives, the intended targets, and the potential for subsequent attacks. Each instance of terrorism is characterized by its distinctive attributes, yielding subtle responses to these inquiries. Nevertheless, there exist commonalities among terrorist incidents. In this section, I shall scrutinize empirical investigations pertaining to the terrorist attacks in Madrid 2004, London 2005, and Paris 2015, all of which precipitated notable aberrations in stock prices on major global stock exchanges.

Johnston and Nedelescu (2005) examined the impact of terrorist attacks on stock markets, both directly and indirectly, reviewed the market reaction to the 9/11 attacks in the United States in September 2001 and the attacks in Madrid in March 2004 and verified that financial markets are not only affected by the physical damage and disruption to communications caused by terrorist attacks, but also by the high levels of uncertainty that they generate. However, there were some differences in the stock market reaction to these two terrorist events - the attacks in Madrid were perceived as having mostly a regional impact, while the attacks in London were seen as having repercussions for the global financial system (Chesney, Reshetar, & Karaman, 2011). Johnston and Nedelescu (2005) suggested that the timing of the attacks may explain this difference. The attacks in London occurred during a period of economic downturn, while the attacks in Spain happened when the world economy was experiencing growth (Chesney, Reshetar, & Karaman, 2011). Johnston and Nedelescu (2005) also suggested that the targets of the attacks may explain the difference in impact. The 9/11 attacks targeted major financial centers, while the Madrid attacks targeted a railway station and commuter trains. The London attacks targeted a variety of targets, including the public transportation system.

Terrorist attacks can have a significant impact on capital markets, both domestically and internationally. Chen and Siems (2004) found that capital markets in the UK, France, and Spain reacted negatively to terrorist attacks, while Bashir, Haq, and Gillani (2013) and Apergis and Apergis (2016) found mixed results in the European and Asia-Pacific regions, respectively. Richman et al. (2005) also found that global equity markets are affected by terrorist attacks. These findings suggest that terrorist attacks can create uncertainty and volatility in financial markets, which can lead to declines in stock prices and other asset values. The impact of a terrorist attack on a capital market will depend on a number of factors, including the severity of the attack, the location of the attack, and the overall health of the economy (Richman et al., 2005).

Kim and Gu (2004) investigated the impact of the 9/11 terrorist attacks on stock markets in the United States. They found that average weekly returns did not change significantly after the attacks, but that market risk and total risk increased significantly for all firms, regardless of size. This suggests that the 9/11 attacks increased uncertainty and volatility in the stock market but did not have a significant impact on expected returns (Kim and Gu, 2004). Schneider and Troeger (2006) studied the impact of the conflict and war between Israel and Palestinians on the global financial market, specifically the CAC, Dow Jones, and FTSE indexes, from 1990 to 2000. Schneider and Troeger (2006) found that conflict and war have a negative impact on financial markets. The findings of this study are aligned with those of previous studies, which have demonstrated that geopolitical risk is a major determinant of stock market volatility and returns.

In his 2007 study, Lin et al. investigated the impact of terrorism on society, with a focus on four major terrorist attacks: the 9/11 attacks, the Bali bombing, the Madrid bombing, and the London bombing, arguing that terrorism creates more opportunities than short-term disruptions in financial markets (Shaikh, 2019). Nguyen and Enomoto (2009) investigated the impact of terrorism on stock returns and volatility behavior on the Pakistan and Teheran Stock Exchanges. They observed significant stock shifts and volatility fluctuations in both markets.
In their study, Kollias, Papadamou, and Stagiannis (2011) conducted an examination into the repercussions of acts of terrorism on stocks of varying capitalization, encompassing both large and small-scale enterprises. Their findings underscore that market dynamics in the aftermath of terrorist incidents are predominantly influenced by factors such as firm size, maturity, and other variables associated with the specific nature of the terrorist attack.

Graham and Ramiah (2012) employed the CAPM framework to investigate the impact of the September 11 and Bali bombings on the London, Madrid, and Mumbai stock exchanges. Their findings revealed that both domestic and transnational terrorist events had a negative impact on stock portfolios.

Kumar and Lee (2006) investigated the impact of terrorism on international stock markets, finding spillover effects among trading partners, such as 2.5% reductions in domestic equity indices. White et al. (2013) examined the patterns of terrorist activity in South Asian countries, measuring risk, resilience, and volatility in these markets. They found that all three measures vary across markets.

Aslam and Kang (2015) conducted an event study of 410 terrorist attacks in Asian stock markets between 1997 and 2011, finding that terrorist events have a negative impact on equity markets, with bombing and suicide attacks generating the largest downward movements.

Apergis and Apergis (2016) investigated the impact of the Paris terrorist attacks on the stock returns of the most important global defense companies using the traditional event study methodology. The outcomes of their investigation indicate that the terrorist attacks resulted in an ascending pattern of cumulative abnormal returns (hereinafter: CARs) for all corporations during the post-attack period, thereby implying a favorable impact on the stock returns of companies operating within the defense sector.

The impact of terrorism on stock market returns and volatility, as well as international portfolio selection, stock-volume relations, global asset pricing, and contagion effects has been documented in previous studies (Adler & Dumas, 1983; Tauchen & Pitts, 1983; Errunza & Losq, 1985; Fields & Janjigian, 1989). Enders and Sandler (1991) specifically examined the performance of equity markets, political and macroeconomic systems under the threat of global terrorism. Enders et al. (1992) also investigated the impact of terrorism on the tourism market and foreign direct investment flows.

A significant body of empirical evidence has examined the impact of terrorism on domestic and transnational equity markets (Carter & Simkins, 2004; Chen & Siems, 2004; Drakos, 2010; Glaser, Weber, & Noeth, 2004; Hon et al., 2004; Mun, 2005).

3 RESEARCH METHODOLOGY

3.1 Methodology

This section presents the methodology used in the study, which encompasses the research design, study population, data collection strategies, and data analysis methods.

This study employs a descriptive event study methodology to analyze the behavior of returns around major attacks on British, French, and Spanish soil. Event study methodology is a quantitative research approach that can be used to measure the market's response to an event, such as mergers, acquisitions, announcements, or new stock issues. This methodology has been widely used in academic research, as evidenced by the work of Fama, Fisher, Jensen, and Roll (1969), Brown and Warner (1980), and Chen and Siems (2004), among others.

Event study methodology is a widely used research approach to analyze and interpret the impact of an event on a particular dependent variable, such as stock price. Event studies examine the abnormal returns of a stock during a specific period (event window) to assess the significance of an event. The event study technique attempts to determine whether there is a statistically significant change in stock price associated with an event, which can provide insights into the market's assessment of the event (Chen & Siems, 2004).

This master's thesis investigates the impact of the terrorist attacks in Madrid 2004, London 2005, and Paris 2015 on the stock price index of securities and insurance companies listed on the IBEX35, FTSE100, and CAC40 indexes. To achieve this objective, the following research questions are formulated:

- Do terrorist attacks have an impact on the abnormal returns of securities on the capital market?
- Do terrorist attacks have an impact on the abnormal returs of insurance companies?

Two subquestions have been divided from the main research question:
- To analyze the impact of the terrorist attacks in Madrid in 2004, London in 2005, and Paris in 2015 on the stock price index of securities on the capital markets IBEX35, FTSE100, and CAC40 (by analyzing ARs).
- To analyze the impact of the aforementioned terrorist attacks on the ARs of the insurance companies on IBEX35, FTSE100, and CAC40.

To test the feasibility of answering the research questions, I identified one crucial variable for analysis to assess its relevance to the research topic.

The dependent variable used in the event study is abnormal return (AR). AR is measured daily over a 61-day period, from 30 days before to 30 days after the terrorist attacks in Madrid, London, and Paris. The day of the attack is designated as day 0. CAR is calculated as the sum of all abnormal returns for the 61-day period. This indicator is commonly used in event studies to examine the impact of different events on stock price fluctuations over a multi-day period (Chen, 2023). AR is defined as the difference between the actual return for a stock or portfolio of securities and the expected return based on market expectations over a given time period (Chen, 2023). The same logic was used to calculate the abnormal returns of the stock prices in the three capital markets.

To verified the first research question, I analyzed the trend of daily fluctuations in the stock price indices of insurance companies listed on the three capital markets during the 61-day period surrounding the attacks (30 days before and 30 days after). To test the correlation between the terrorist attacks and stock price index fluctuations in each capital market separately, I conducted three one-way ANOVA tests (the effect of the Madrid attack on IBEX35, with "occurrence of terrorist attack in Madrid" as the dependent variable; the effect of the London attack on FTSE100, with "occurrence of terrorist attack in London" as the dependent variable; and the effect of the Paris attack on CAC40, with "occurrence of terrorist attack in Paris" as the dependent variable). The same logic was applied to verified the second research question.

Additionally, I conducted a Patell t-test to assess the statistical significance of the event windows (-30; +30) for each of the three terrorist attacks separately. I also conducted a mean

comparison test in STATA to examine the statistical significance of the mean difference in the variable ARs between the two groups (group 0: insurance companies listed on the capital markets at the time, and group 1: the capital markets during the same timeframe).

The event study technique is premised on the assumption that the market is efficient. This means that if the market is efficient, the impact of an event will be immediately reflected in the stock prices of the affected firm(s), which allows us to observe the financial impact of the event over a relatively short time period (Woon, 2004).

Event study methodology is widely used by insurance companies and insurance professionals to assess the impact of insured and uninsured events on individual firms (Woon, 2004). Event studies are further divided into market efficiency studies and information utilization studies (Henderson, 1990). The former examines how quickly and accurately the market responds to a particular type of new information, while the latter examine the extent to which corporate returns respond to the release of a particular news item (Henderson, 1990). In event studies that analyze stock returns where the event is a political, economic, or natural crisis, autoregressive conditional heteroskedasticity (ARCH) and generalized autoregressive conditional heteroskedasticity (GARCH) models have become increasingly popular because they account for changes in mean market returns and changes in the volatility of returns (Anh & Carl, 2009).

3.2 Selected insurance companies and the corresponding stock markets

This section focuses on the listed insurance companies and their corresponding stock markets, with a brief description of the capital markets. In statistics, a population is defined as the complete set of individuals or objects of interest in a particular study (Gonick, 1993). Currently, there is only one insurance company listed in the French CAC40 and Spanish IBEX35 indices, while there are five insurance companies listed in the British FTSE100 index.

Listed insurance company on IBEX35 index:

- Mapfre S.A.

Mapfre S.A. is a global insurance company with a presence on five continents and it is the benchmark insurer in the Spanish market, the leading multinational insurance group in Latin America, and one of the top 10 insurance companies in Europe by premium volume (Mapfre, 2020). Mapfre offers a wide range of insurance products, including life, health, accident, property, and casualty insurance (e.g., automobile and homeowner insurance, personal third-party liability insurance, etc.), as well as savings and investment, retirement, burial, and travel and leisure insurance solutions (Mapfre, 2020).

Listed insurance companies on FTSE100 index:

- Admiral Group PLC
- Aviva PLC
- Prudential PLC
- Legal & General Group PLC
- RSA Insurance Group PLC

Admiral Group PLC is a prominent Financial Services company listed on the FTSE100 index, with operations in the United Kingdom, Europe, and the Americas. The company offers a range of insurance products, including motor, household, travel, and pet insurance, as well as personal lending products through Admiral Loans (Reuters, 2022). The company's business segments are UK Insurance, International Insurance, Admiral Loans, and Other (Reuters, 2022).

Aviva PLC is a United Kingdom-based holding company that provides savings, retirement, and insurance products and services. Its products and services include long-term business, general insurance, health, and fund management (Reuters, 2022). The company's business segments are UK & Ireland Life, UK & Ireland General Insurance, Canada General Insurance, and Aviva Investors (Reuters, 2022). The company's business segments are UK & Ireland Life, UK & Ireland General Insurance, Canada General Insurance, and Aviva Investors (Reuters, 2022).
Prudential PLC is a globally operating financial services conglomerate headquartered in the United Kingdom, specializing in the provision of life and health insurance, as well as asset management products, primarily within the regions of Asia and Africa. The core mission of the company is to safeguard the financial well-being of its clientele, facilitate the growth of their financial holdings, and facilitate savings for their envisioned objectives. Prudential's operational footprint extends diversely across the Asian and African territories, with a particular emphasis on the domains of health and protection, as outlined in Reuters (2022).

Legal & General Group PLC (Reuters, 2022) is a British financial services company with headquarters in London. The company's business segments include:

- Legal & General Retirement Institutional: This segment provides pension risk transfer and longevity insurance solutions to institutional clients around the world (Reuters, 2022).
- Legal & General Capital: This segment invests in direct assets, such as specialist commercial real estate, clean energy, housing, and small and medium-sized enterprises (SME) finance, as well as traded and treasury assets (Reuters, 2022).
- Legal & General Investment Management: This segment is one of the world's largest asset managers, providing investment solutions to institutional and retail clients. Insurance: This segment provides a range of insurance products, including life insurance, general insurance, and protection products (Reuters, 2022).
- Retail Retirement: This segment provides retirement savings products and services to individuals (Reuters, 2022).

The company's business is focused on helping people achieve their financial goals, such as saving for retirement, protecting their families, and investing for the future.

RSA Insurance Group PLC is a multinational general insurance company that offers a wide range of personal and commercial insurance products and services worldwide (Chcom, 2020). Its products and services are designed to help people and businesses protect themselves from financial losses in the event of unforeseen events. RSA Insurance Group is a well-established and respected company with a strong track record of financial performance (Chcom, 2020).

Listed insurance company on CAC40:
- AXA S.A.

AXA S.A. is a global financial services company that provides a broad range of financial protection products and services to individuals and businesses (Reuters, 2023). The company's business is divided into five segments: Life & Savings, Property & Casualty, Health, Asset Management, and Banking. AXA S.A. has a strong presence in over 60 countries around the world (Reuters, 2023).

The IBEX35 is the Spanish stock market's benchmark index, which tracks the performance of the 35 most liquid and highly capitalized stocks traded on the Bolsa de Madrid, Spain's main stock exchange (Bloomberg L.P). The index is managed and calculated by Sociedad de Bolsas, a subsidiary of BME, the company that operates the Spanish securities markets. The IBEX35 is a market capitalization-weighted index, meaning that the weight of each stock in the index is proportional to its market capitalization (Bloomberg L.P). The index is reviewed twice a year to ensure that it continues to reflect the performance of the most relevant and liquid companies in the Spanish stock market. Options and futures contracts on the IBEX35 are traded on the Mercado Español de Futuros Financieros, another subsidiary of BME (Bloomberg L.P).

The FTSE 100 Index is a stock market index that tracks the performance of the 100 largest companies listed on the London Stock Exchange, weighted by their market capitalization (Bloomberg L.P). The FTSE 100 Index is a highly influential stock market index that is closely monitored by investors, analysts, and policymakers around the world, maintained by the FTSE Group, a subsidiary of the London Stock Exchange Group (Bloomberg L.P). The index is calculated and disseminated continuously every second that the market is open. The FTSE 100 Index was launched on January 3, 1984, and replaced the FT30 Index as the benchmark for most investors. The index is designed to provide a broad measure of the performance of the UK stock market (Bloomberg L.P).

The CAC40 is a free-float market capitalization-weighted index of the 40 largest and most actively traded shares listed on Euronext Paris, the largest stock exchange in France

(Bloomberg L.P). It is the most widely used indicator of the performance of the French stock market. The index serves as an underlying for a variety of financial products, including structured products, funds, exchange-traded funds, options, and futures. The CAC40 is operated by Euronext, the pan-European stock exchange group (Bloomberg L.P).

3.3 Data gathering

Secondary data is data that has already been collected by other researchers for other purposes and is then reused by a researcher for their own research. Secondary data can be acquired from a diverse range of origins, such as government publications, academic journals, industry reports, and company websites. In this master's thesis, secondary data was used to examine daily individual stock prices. The data was obtained from Thomson Reuters Eikon, a financial information service that provides access to data on markets, stocks, stock indices, historical financial data, companies, and economic information (Thomson Reuters Corporation, 2021). Secondary data is a valuable resource for researchers because it can be used to:

- Gain an overview of a topic.
- Identify trends and patterns.
- Test hypotheses.
- Compare and contrast different groups.
- Support arguments and conclusions.

Thomson Reuters Eikon (formerly known as Refinitiv Eikon) is a financial data platform that provides users with access to information, research, and analytical tools. It is a more affordable alternative to the Bloomberg Terminal, and it is widely used by financial professionals around the world. Eikon allows users to screen and analyze financial data, access market data, news, country and economic data, analytics, and trading tools and can also be exported to Microsoft Excel for further analysis (Thomson Reuters Corporation, 2021). Apart from its conventional financial data functionalities, Eikon also provides tools for social media scrutiny, including the analysis of all tweets related to a specific subject to discern whether they express positive or negative sentiment. This can be a valuable tool for investors who want to stay ahead of the market curve. Overall, Thomson Reuters Eikon is a powerful financial data platform that offers a wide range of features at an affordable price. It is a valuable tool for financial professionals of all levels, from individual investors to institutional traders (Thomson Reuters Corporation, 2021).

In 2018, Thomson Reuters and The Blackstone Group established a joint venture named Refinitiv, in which Blackstone held a 55% stake, and in January 2021, they sold Refinitiv to the London Stock Exchange Group for $27 billion (Thomson Reuters Corporation, 2021).

Refinitiv, a financial data and information provider, serves more than 40,000 institutions across approximately 190 countries, and it operates Refinitiv Eikon through a 30-year agreement to use Reuters data (Thomson Reuters Corporation, 2021).

Based on the foregoing, I believe that Thomson Reuters Eikon is a relevant source for my database to perform the research for this thesis.

3.4 Data analysis

This research delves into a comparative analysis of three terrorist incidents that occurred within the European Union: specifically, the Madrid train bombings that transpired on March 11, 2004, the London attacks of July 7, 2005, and the Paris attacks that unfolded on November 13, 2015. The selection of these events for examination is predicated upon their respective quantifiable metrics, encompassing the estimated magnitude of property damage incurred, the extent of injuries inflicted, and the overall number of fatalities resulting from these acts of terrorism.

To assess the extent of these events' influence on the stock market, this investigation will compute opportunity day abnormal returns and cumulative abnormal returns, subsequently subjecting them to statistical significance testing. The initial stage of the event study will involve pinpointing the event date. It is important to note that, for explanatory clarity, the event date does not coincide with the precise occurrence of the event but rather corresponds to the time interval within which the informed and attentive segment of the market reasonably anticipated the event to unfold.

This study uses an event study methodology to examine the impact of terrorist attacks on the stock market returns of insurance companies. The event window is 61 days, with 30 days before and 30 days after the attack, with the event day taken as day 0. The first step is to characterize the returns of the stock price index of securities on the capital market in London, Paris, and Madrid in the absence of terrorism-related news. The second step is to characterize the returns of each insurance company stock that is listed in the French CAC40 index, Spanish IBEX35 index, and British FTSE100 index. This is used to break down the effect of the event on stock profits by determining the abnormal return (AR). The abnormal return is the difference between the actual return of the security over the event window and the expected return of the security over the event window, in the absence of the event and reflects the impact of the event on the stock return (Barone, 2021).

In a mathematical equation:

$$Abnormal\ returns = actual\ returns - expected\ returns \qquad (3)$$

The abnormal return for firm i over event date α is calculated as follows:

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

where:

AR_{it} is the abnormal return for the stock of firm i for the period *t*,

R_{it} is the actual return for the stock of firm i for the period *t*,

$E(R_{it}/X_t)$ is the actual return for the stock of firm i for the period *t* (Barone, 2021).

The conditioning information X_t is typically defined as the information that was available to investors prior to the event date *t*. This may include information such as the firm's financial statements, news announcements, and analyst research reports (Barone, 2021).

To model the normal rate of return, the market model is applied, where X_t is the market return (Chen, 2023). The main assumption in this model is that there is a linear relationship between the market return and the security return (Chen, 2023).

For any stock *i*, the market model can be expressed as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (5)$$

where:

- Ri_t is the expected return of stock *i*,
- α_i is the alpha of stock *i*, which is a measure of the stock's performance relative to the market,
- β_i is the beta of stock *i*, which is a measure of the stock's sensitivity to market movements,
- R_m is the return of the market,
- ϵ_i is the error term (Chen, 2023).

To draw generalizable inferences about the event of interest, it is important to consider the curious perceptions of returns, or the unexpected market reactions to the event. Cumulative abnormal returns (CARs) are ascertained through the summation of the mean abnormal returns observed throughout the specified event window. This metric serves as a valuable tool in discerning whether the event exerted a favorable or unfavorable influence on stock performance, as elucidated by Barone (2021).

Let CAR_i (t_1, t_2) denote the observation of cumulative abnormal return from firm *I* from time t_1 to t_2 where $t_1=n$-30 and $t_2=n$+30. The CAR from t_1 to t_2 is the sum of the abnormal returns over the event window:

$$CAR_i\ (t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} \quad (6)$$

4 DATA ANALYSIS, RESULTS AND ANALYSIS

This section will expound upon the outcomes of the inquiry, structured in alignment with the study's established objectives. The initial subsection will furnish an outline of the methodology employed for data analysis. Subsequently, the second subsection will delineate the research findings, accompanied by pertinent tables and figures designed to elucidate the outcomes. The concluding subsection will offer a succinct recapitulation of the findings and a scholarly interpretation thereof.

4.1 Data analysis

This research undertakes an investigation into the repercussions of terrorist attacks on the performance of insurance stocks and their broader impact on the capital market. Employing the event study methodology, the study scrutinizes the performance of both securities and insurance firms in the lead-up to and aftermath of three specific terrorist attacks. The dataset, sourced from authorized Thomson Reuters data vendors, was acquired in Excel format and subjected to analysis through the Excel data analysis toolkit, resulting in the derivation of pertinent statistical inferences. A parametric t-test, facilitated by STATA, was subsequently executed to ascertain the statistical significance of the abnormal returns exhibited by insurance companies listed on the three respective capital markets during the specified time periods, as well as the abnormal returns of the capital markets themselves during said intervals. The event window, encompassing a period of 30 days prior to and 30 days subsequent to the attack, designates day 0 as the precise day of the attack for analytical purposes.

4.2 Analysis results

The primary statistical software used to analyze and interpret the data for this master's thesis was STATA. This software was chosen because it offers the ability to perform time series analyses, which was necessary for the data in this study. Microsoft Excel was used as a secondary tool for data analysis and calculations, such as the Pattel t-test for the event windows of the three terrorist attacks and the calculation of the expected, actual, abnormal, and cumulative abnormal returns. Becketti (2020) notes that statistical software packages vary widely in their representations of time series data and their capabilities for time series analysis. Some packages, such as STATA, are specifically designed for time series analysis, while others require the data to be transformed into a format that is compatible with their cross-sectional analysis capabilities.

4.2.1 Abnormal and cumulative abnormal returns

This master's thesis employs the event study methodology as a means to quantify the influence of terrorist attacks on the stock returns of insurance companies and the broader capital market. To estimate the anticipated return for each stock, the market model was utilized, encompassing a 30-day estimation period before and after the event window. The computation of expected returns, abnormal returns, and cumulative abnormal returns for each insurance company is provided in Appendix 2, with AXA S.A. serving as an illustrative example. In Appendix 2, Appendix 3, Appendix 4, and Appendix 5, the event-day abnormal returns and cumulative abnormal returns for each of the three investigated terrorist attacks (Madrid 2004, London 2005, and Paris 2015) are presented within the database. Furthermore, statistical significance tests were conducted individually for each of these three terrorist incidents.

In this section, we provide an interpretation of the six linear plots, delineated in Figures 3 through 8. These graphical representations illustrate the abnormal returns and cumulative abnormal returns exhibited by the examined insurance firms listed on the IBEX 35, FTSE 100, and CAC 40 indices, in addition to the abnormal returns and cumulative abnormal returns of the corresponding capital market indices. These analyses are conducted in the aftermath of the terrorist attacks that transpired in Madrid in 2004, London in 2005, and Paris in 2015.

To do so, I used the Thomson Reuters database to obtain daily market returns on the capital markets and daily returns of the listed insurance companies on these three capital markets for a period of 30 days before and 30 days after the terrorist attacks. From this database, I calculated the four main parameters needed to calculate the abnormal and cumulative abnormal returns: the intercept, the slope, the R-squared, and the standard error.

The intercept, commonly known as the constant term, represents the mean value of the response variable (i.e., the returns of the insurance companies) when all of the predictor variables (i.e., the returns of the capital market indices) are equal to zero (Nguyen, 2022). In this study, the intercept is calculated by taking the average of the daily actual market returns of the insurance companies listed on the IBEX 35, FTSE 100, and CAC 40 indices for a period of 193 days before the study timeframe (i.e., 30 days before the terrorist attacks occurred in Madrid, London, and Paris). The average of the daily actual market returns of the capital market indices of the IBEX 35, FTSE 100, and CAC 40 for the same 193 days before the study timeframe is also used to calculate the intercept.

The slope is the parameter that quantifies the relationship between the dependent variable (i.e., the market returns of the insurance companies) and the independent variables (i.e., the market returns of the capital market indices), adjusted for the ratio of the standard deviations of the variables (Nguyen, 2022). To calculate the slope, the same timeframe as for the

intercept is used, i.e., the average of the daily actual market returns of the insurance companies listed on the IBEX 35, FTSE 100, and CAC 40 indices for a period of 193 days before the study timeframe (i.e., 30 days before the terrorist attacks occurred in Madrid, London, and Paris) is used, as is the average of the daily actual market returns of the capital market indices of the IBEX 35, FTSE 100, and CAC 40 for the same 193 days before the study timeframe.

The third calculated parameter is the coefficient of determination (R-squared), a statistical measure of the goodness of fit of a regression model (Nguyen, 2022). R-squared is a measure of how much of the variation in the dependent variable can be explained by the independent variable(s) in a regression model (Nguyen, 2022). It is a statistical measure that represents the proportion of the variance in a dependent variable that is explained by an independent variable in a regression model (Nguyen, 2022). In this study, the dependent variable is the market returns of insurance companies, and the independent variable is the market returns of capital stock market indexes. R-squared is calculated as the ratio of the sum of squares regression and the total sum of squares. For the calculation of R-squared, the author used the same timeframe as for the other parameters explained in the paragraph. This timeframe is 193 days before the study timeframe, which is 30 days prior to the terrorist attacks in Madrid, London, and Paris. The author used the daily actual market returns of insurance companies listed on IBEX35, FTSE100, and CAC40 for this timeframe, as well as the daily actual market returns of the capital market indexes of IBEX35, FTSE100, and CAC40 for the same timeframe.

The final parameter calculated for the abnormal returns and cumulative abnormal returns is the standard error. This is a statistical measure of the variability in the sampling distribution of a statistic, such as the mean, calculated by dividing the standard deviation of the sample by the square root of the sample size and is useful for assessing the statistical significance of a result (Nguyen, 2022). As an illustration, when we contrast the average abnormal returns of insurance companies before and after a terrorist attack, we can utilize the standard error to compute the likelihood of randomly observing such a discrepancy in means. If the probability of obtaining the observed difference in means by chance is very low (e.g., less than 5%), then we can reject the null hypothesis and conclude that the difference in means is real and not due to chance (Nguyen, 2022). In this study, the author used the same timeframe to calculate the standard error as for the other parameters. This timeframe is 193 days before the study timeframe, which is 30 days prior to the terrorist attacks in Madrid, London, and Paris. The author used the daily actual market returns of insurance companies listed on IBEX35, FTSE100, and CAC40 for this timeframe, as well as the daily actual market returns of the capital market indexes of IBEX35, FTSE100, and CAC40 for the same timeframe.

Having established the critical parameters employed in computing the abnormal returns and cumulative abnormal returns depicted in the subsequent six linear plots (figure 3 through

figure 8), I will now provide a concise outline of the process involved in generating these visual representations.

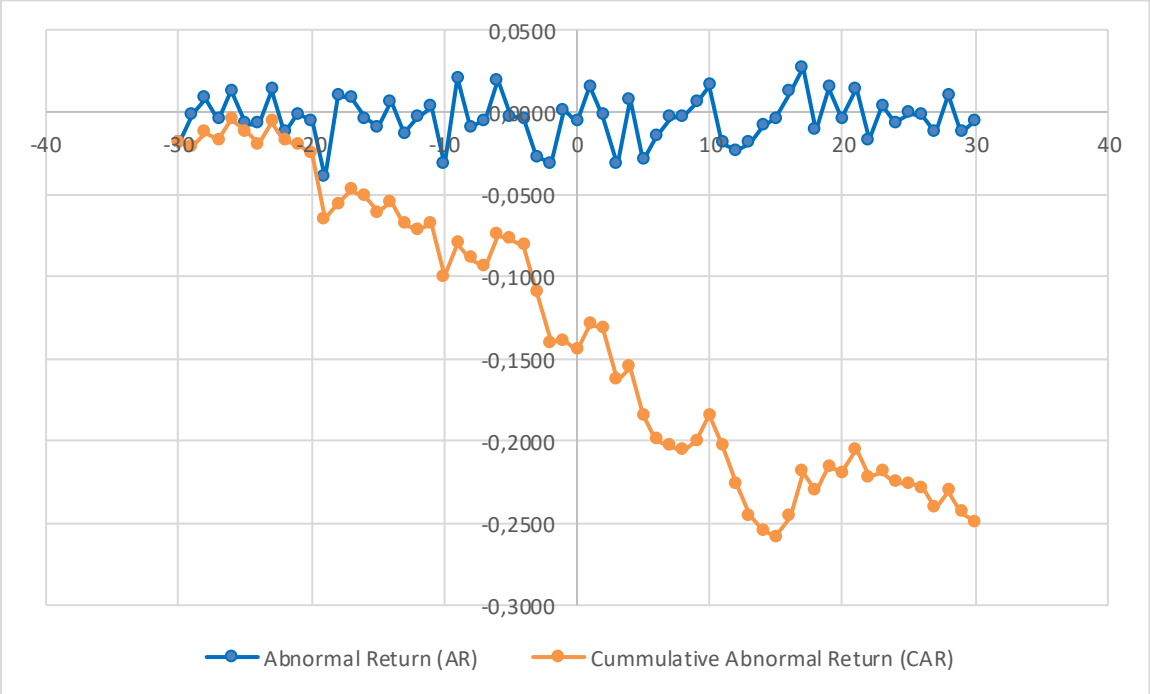
The expected daily market return is a statistical measure of the average daily change in the market index over a period of time, used to calculate abnormal returns, which are the returns of an asset that are in excess of the expected daily market return (Chen, 2023). Abnormal returns are the returns of an asset in excess of the expected market return. They can be positive or negative, and they can be used to measure the performance of an asset relative to the market (Chen, 2023).

*Expected daily market return of the insurance companies = intercept + slope * the daily market return of the capital market index.* (7)

Abnormal daily market return of the insurance companies = actual daily market return – expected daily market return of the insurance companies or the market capital indexes. (8)

The cumulative abnormal return is the total abnormal return of an asset or portfolio over a specific period of time, calculated by summing the abnormal returns of the asset or portfolio over the period. (Chen, 2023).

Figure 3: Line graph showing the abnormal returns and cumulative abnormal returns of Mapfre S.A. on the IBEX35 index during the Madrid attack in 2004



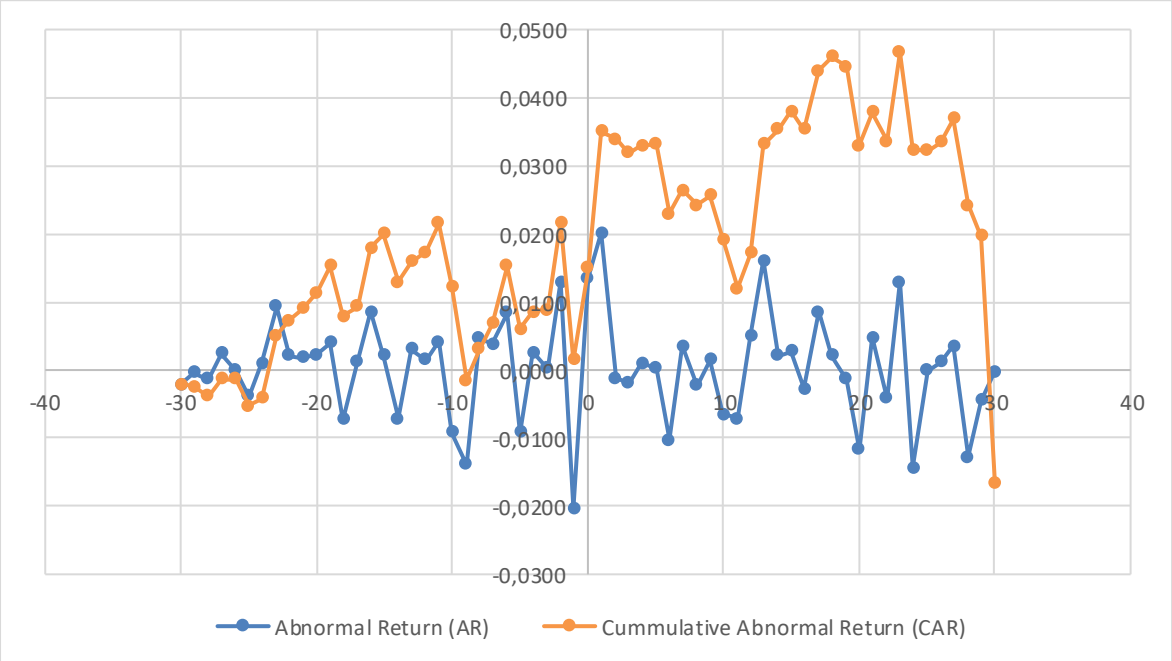
Note: The data for Mapfre S.A. index is from Thomson Reuters Eikon (2021a).

Figure 3 depicts the AR and CAR of Mapfre S.A. on the IBEX35 index during the terrorist attack in Madrid in 2004. The AR appears random 30 days before the attack, but there is a noticeable increase in the AR on the day after the attack. The CAR then experiences a sharp drop to -3.2% three days after the attack, followed by random fluctuations until the fifth day. The AR then increases for five consecutive days, before dropping again. The longest continuous increase in the AR occurs between days 5 and 10, and again between days 12 and 17, when it reaches a peak of 2.7% during the observed period.

Worth to mention that the abnormal return at the day of the attack and 30 days afterwards was the same -0.5%, which is still higher by 0.0135 percentage points compared to the abnormal return 30 days prior the attack in 2004.

From the line plot in figure three we can also see the CAR (represented in an orange line on the chart) declining over time, due to the abnormal return being mostly negative during all 61 days.

Figure 4: Line chart showing the abnormal returns and cumulative abnormal returns of five insurance companies on the FTSE100 index during the London attack in 2005



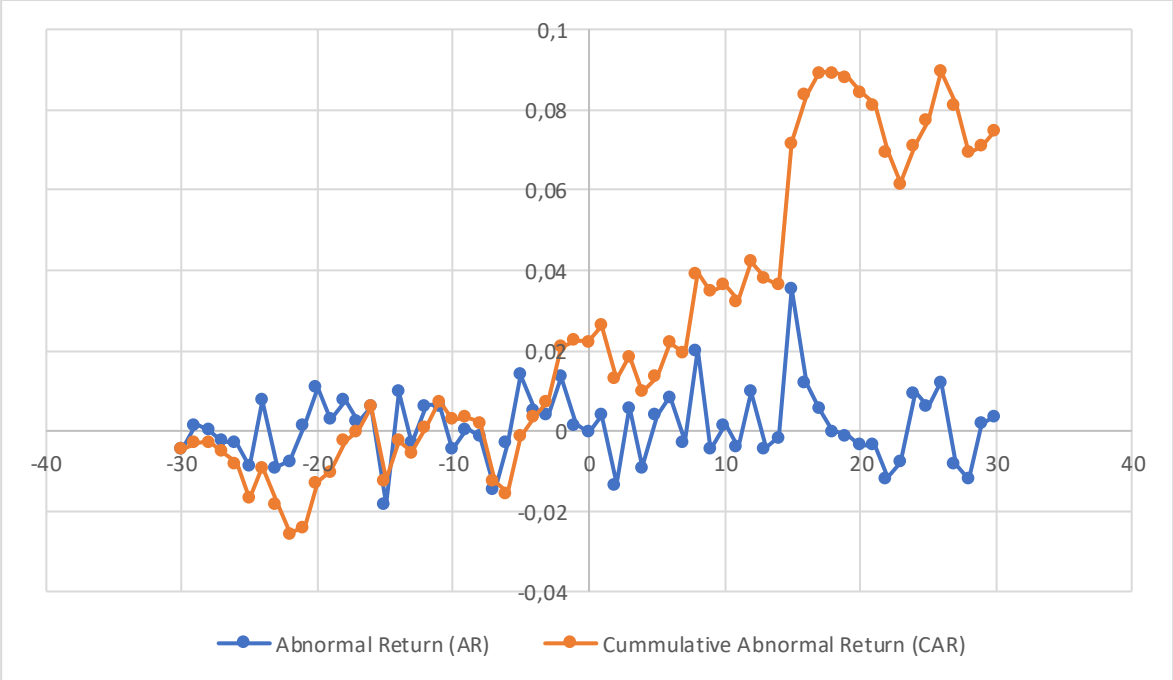
Note: The data for Admiral Group PLC index, Aviva PLC, Prudential PLC index, Legal & General Group PLC index and RSA Insurance Group PLC index is from Thomson Reuters Eikon (2021b).

Figure 4 shows the AR and CAR of insurance companies on the FTSE100 index during the terrorist attack in London in 2005. The AR appears random 30 days before the attack, with a sharp decline to -1.8% 4 days before the attack. The AR then declines to -0.6% on the day

of the attack but recovers slightly to 1.9% two days later the attack. A pattern of alternating positive and negative ARs is observed from day 16 to day 30.

Interestingly, the AR 30 days after the attack is 0%, which is 0.04 percentage points higher than the AR 30 days before the attack. Unlike the CAR of Mapfre S.A. listed on IBEX35 in Madrid, the CAR of insurance companies listed on FTSE100 in 2005 does not show a strictly declining trend. The CAR increases on the second day after the attack, and again on days 13 and 14.

Figure 5: Line chart showing the abnormal returns and cumulative abnormal returns of AXA S.A. on the CAC40 index during the terrorist attack in Paris in 2015



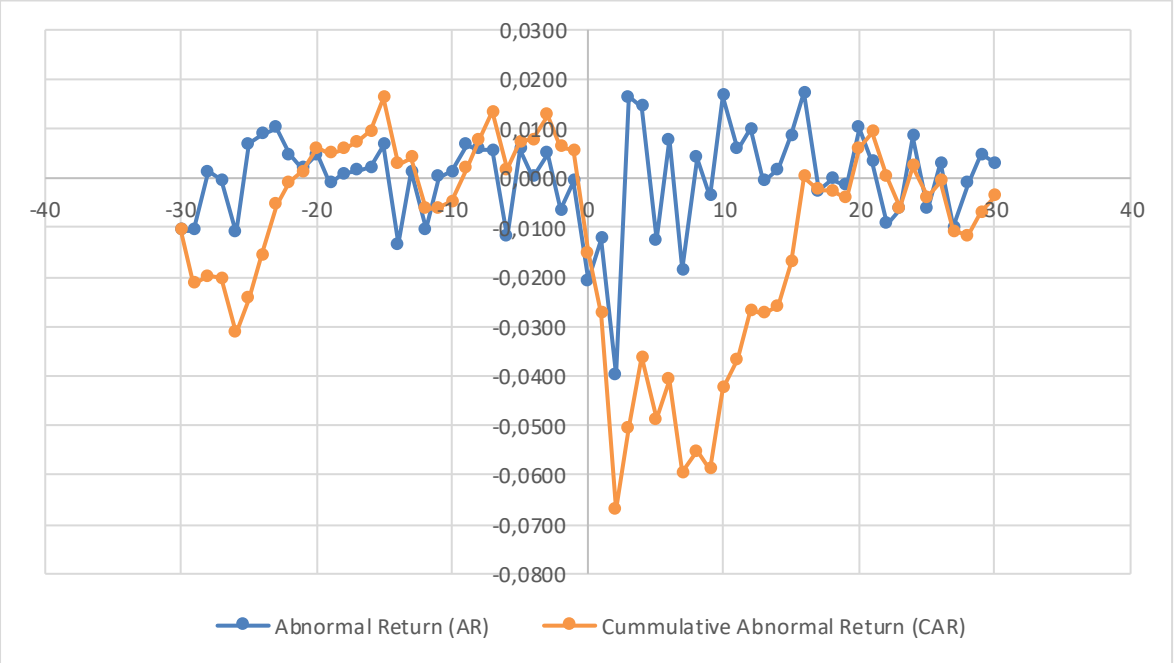
Note: The data for AXA S.A. index is from Thomson Reuters Eikon (2021c).

Figure 5 shows the AR and CAR of AXA S.A. on the CAC40 index during the terrorist attack in Paris in 2015. The AR appears random 30 days before the attack, starting with a negative AR of -0.4% on the first day of the study period and increasing slightly to 0% on the day of the attack (indicating that the actual and expected returns of AXA S.A. were equal on that day). Two days after the attack, the AR of AXA S.A. on CAC40 declined to -1.3%, the lowest AR after the attack. Thereafter, the AR fluctuates daily, with more positive values (above 0), reaching a peak of 3.5% on day 15.

On day 30, the AR was 0.008 percentage points higher than the AR 30 days before the attack.

The pattern shown in Figure 5 is quite different from Figures 3 and 4, in that the CAR shows an overall increasing trend, reaching 6.8% on the last observed day (30 days after the terrorist attack in Paris in 2015).

Figure 6: Line chart showing the abnormal return and cumulative abnormal return of IBEX35 index during the Madrid attack in 2004



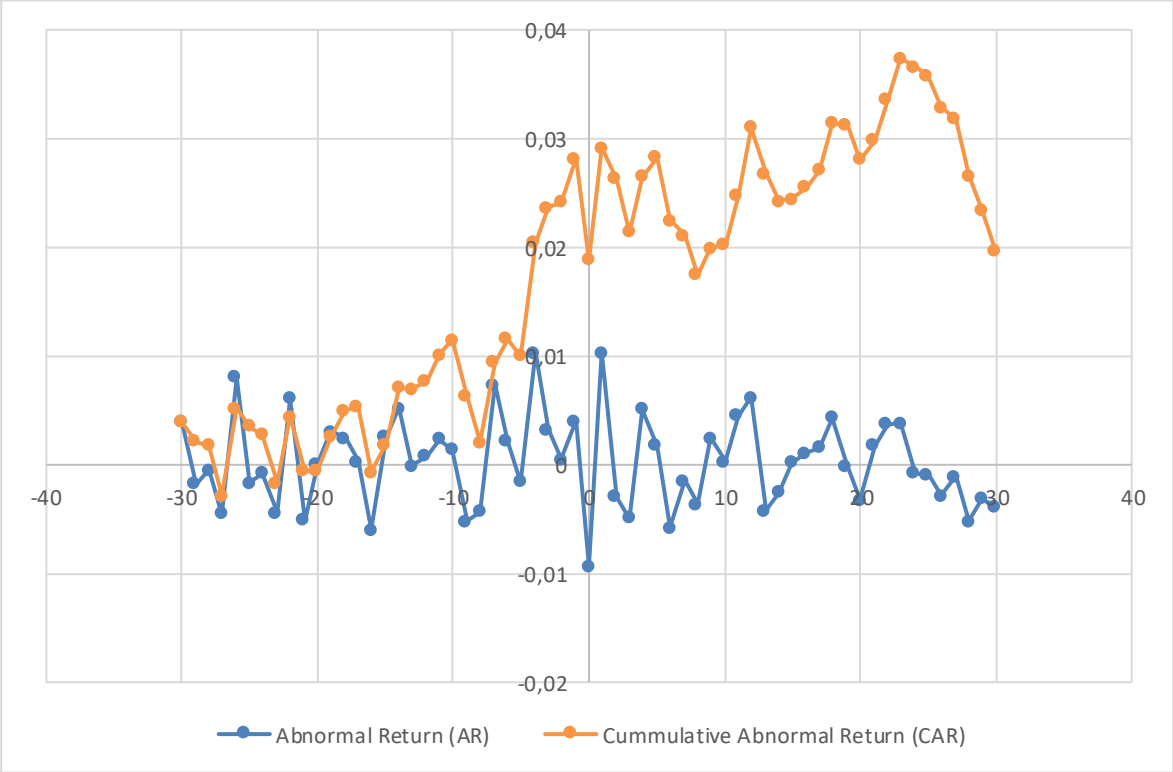
Note: The data for IBEX35 index is from Thomson Reuters Eikon (2021d).

Figure 6 illustrates the linear plot depicting the Abnormal Returns (AR) and Cumulative Abnormal Returns (CAR) of the IBEX35 capital market index during the 2004 terrorist attack in Madrid. In the 30 days leading up to the incident, the AR displays a seemingly random pattern, characterized by predominantly slight positive fluctuations. However, a notable decline in the AR is observed on the day of the attack (-2.07%), compared to its position 30 days earlier (-1.06%). The most substantial decrease in the AR occurs on the second day following the attack (-3.96%). Subsequently, the AR exhibits predominantly positive values, indicating that the actual returns consistently surpassed the anticipated returns for the IBEX35 index across much of the observation period. Concluding the observation period, the AR on day 30 stands 0.014 percentage points higher than the AR on the initial observed day (30 days before the attack).

Upon closer scrutiny of the Cumulative Abnormal Returns (CAR) in Figure 6, a discernible pattern emerges, characterized by a declining trajectory until the second day following the terrorist attack. Subsequently, there is a noticeable shift towards an ascending trend, indicating a potential recovery or adaptation in the market sentiment. Nevertheless, a crucial observation is that, despite this upward movement, the CAR consistently maintains a negative stance throughout the entirety of the observation period. This persistent negativity within the CAR unveils the enduring repercussions and challenges confronted by the IBEX35 index in the aftermath of the terrorist attack in Madrid. The sustained negative CAR signifies that, despite potential recoveries or fluctuations in daily abnormal returns, the overall cumulative impact over the observation period reflects an ongoing deviation from

expected returns. This sustained negativity underscores the resilience required for the market to overcome the enduring uncertainties and adverse effects introduced by the unexpected event. Analyzing the CAR provides a comprehensive perspective on the prolonged market dynamics, contributing to a deeper understanding of the sustained impact of the Madrid terrorist attack on the IBEX35 index.

Figure 7: Line chart showing the abnormal return and cumulative abnormal return of FTSE100 index during the London attack in 2005



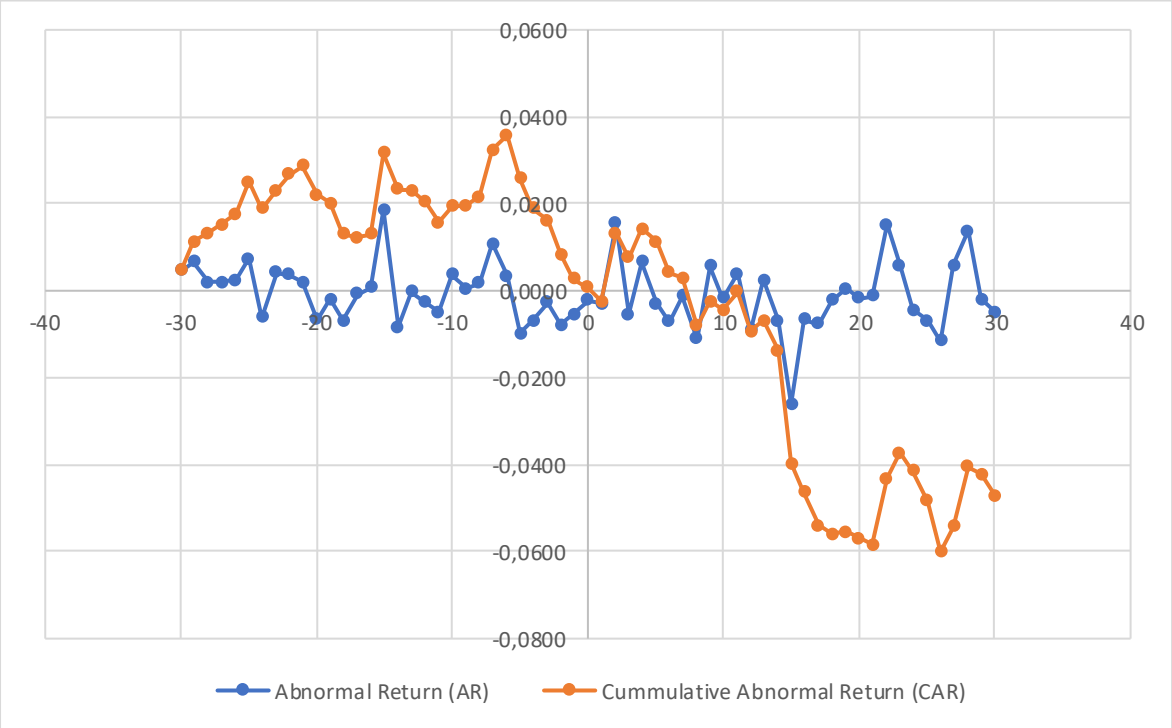
Note: The data for FTSE100 index is from Thomson Reuters Eikon (2021e).

Displayed in Figure 7 is the linear plot illustrating the Abnormal Returns (AR) and Cumulative Abnormal Returns (CAR) of the FTSE100 capital market index during the 2005 terrorist attack in London. A month before the attack, the AR exhibited a positive trend, standing at +0.4%. However, a substantial decline ensued on the day of the attack, plummeting to -0.93%, marking the most significant decrease in AR throughout the observation period.

Following the immediate impact, the AR demonstrated resilience, maintaining mostly positive values. Despite this recovery, it's noteworthy that on day 30 after the attack, the AR still lingered in negative territory at -0.36%. Despite the persistent negative AR on day 30, the Cumulative Abnormal Return (CAR) remained positive across the entire observation period spanning 61 days.

This intriguing dynamic suggests that, while the individual daily abnormal returns may experience fluctuations, the cumulative impact over the observed period reflects an overall positive deviation from expected returns. This underscores the importance of examining cumulative trends for a comprehensive understanding of the sustained market response to the London terrorist attack in 2005.

Figure 8: Line chart showing the abnormal return and cumulative abnormal return of CAC40 index during the Paris attack in 2015



Note: The data for CAC40 index is from Thomson Reuters Eikon (2021f).

Examining the linear plot in Figure 8, the Abnormal Return (AR) for the CAC40 capital market index presents an interesting pattern. Thirty days before the Paris terrorist attack, the AR exhibited a positive inclination at +0.47%, reflecting a certain level of market optimism or stability prior to the tragic event. However, as the event unfolded, the AR displayed random fluctuations during the 61-day observation period, indicative of the inherent volatility and uncertainty in the aftermath of such incidents. Delving into the Cumulative Abnormal Return (CAR) dynamics, a nuanced narrative unfolds. The CAR showcased an upward trend until five days preceding the attack, suggesting a positive market sentiment leading up to this critical point. Subsequently, there was a decline in the CAR leading to the day of the attack. Post-attack, the CAR demonstrated resilience, experiencing a subsequent increase until day 13, followed by a declining trend, marked by the most significant drop on day 21 (-1.26%). In summary, the linear plot for the Paris attack, as seen in Figure 8, adds another layer to the broader analysis of how terrorist incidents impact stock prices, both for insurance companies and the capital market itself. This detailed examination sets the stage

for the exploration of two research questions, delving deeper into the specific effects on stock prices and the financial resilience of these markets in the face of unforeseen events.

4.2.2 Statistical test

This study employed a one-way ANOVA analysis conducted using STATA software to test the following research questions:

- What is the effect of the 2004 Madrid terrorist attack on Mapfre S.A. and IBEX35 index?
- What is the effect of the 2005 London terrorist attack on insurance companies listed on FTSE100 and FTSE100 index?
- What is the effect of the 2015 Paris terrorist attack on AXA S.A. and CAC40 index?

The analysis was conducted for a time frame of 61 days (30 days before and 30 days after the attacks took place), with the day of the attack taken as day 0.

Prior to employing the one-way ANOVA analysis in STATA software to test the research questions, I conducted the Pattel test in Excel to assess the statistical significance of the event windows (-30;+30) for each of the three terrorist attacks and their impact on the insurance companies listed on the three stock markets (Mapfre S.A. for Madrid, Admiral Group PLC, Aviva PLC, Prudential PLC, Legal & General Group PLC, and RSA Insurance Group PLC for London, and AXA S.A. for Paris), as well as the statistical significance of the event windows (-30;+30) for each of the three terrorist attacks and their impact on the three stock markets (IBEX35, FTSE100, and CAC40).

Patell's (1976) statistic is a non-parametric test for event studies that is used to assess the statistical significance of the average abnormal return on the event day. It is calculated as follows:

$$t_p = \frac{\overline{A}\sqrt{n}}{\sqrt{(m\text{-}2)/(m\text{-}4)}} = \overline{A}\sqrt{\frac{n \times (m\text{-}4)}{m\text{-}2}} \qquad (8)$$

where $\overline{A}$ is the mean standardized abnormal return of the sample of n firms on the event day and m is the number of observations in the estimation period (Pattel, 1976). In other words, $\overline{A}$ is the average difference between the actual returns of the firms in the sample on the event day and the expected returns, based on the market model (Pattel, 1976).

The results from the Pattel t-tests are presented in the below two tables.

Table 2: Pattel t-test by taking CAR of the insurance companies listed on the three capital markets in Madrid, London and Paris for the time frame of (-30;+30) days from the terrorist attacks in all three locations separately:

Terrorist attack	Event window	t statistic of CAR
Madrid	Window (-30,+30)	-2,1688
London	Window (-30,+30)	-0,1909
Paris	Window (-30,+30)	0,0749

Source: Own work

Table 3: Pattel t-test by taking CAR of the three capital markets in Madrid, London and Paris for the time frame of (-30;+30) days from the terrorist attacks in all three locations separately:

Terrorist attack	Event window	t statistic of CAR
Madrid	Window (-30,+30)	-0,0327
London	Window (-30,+30)	0,2264
Paris	Window (-30,+30)	-0,3703

Source: Own work

The results of the Pattel t-test reveal that the terrorist attack in Madrid in 2004 had a statistically significant negative effect on the returns of the insurance company, Mapfre S.A., which is listed on the IBEX35 index, over the examined period of 61 days (refer to table 2). This is visible by the calculated t-value of -2.16, which is greater than the absolute value of the critical t-value of 1.96 t-statistic[2] at a 5% significance level.

The remaining results for the insurance companies are not statistically significant, suggesting that the observed fluctuations in their returns during the 61-day window period (see table 2) may have been due to other external factors.

The Pattel t-test results for the capital markets (IBEX 35 in Madrid, FTSE100 in London, and CAC40 in Paris) are not statistically significant, suggesting that other external factors may have influenced the fluctuations in their returns during the 61-day window period (see

[2] For level of significance 0.05, the correspondent t-stat value is 1.96.

table 3). One such factor is the presence of many other companies from different industries listed on these exchanges during the same period.

To assess the statistical significance of the mean difference in AR between the two research groups (group 0: insurance companies listed on the capital markets at the time; and group 1: the capital markets during the same timeframe), I conducted a mean comparison test in STATA (figures 9-14). The first step was to analyze the mean difference of AR.

To compare the mean difference in AR between Mapfre S.A. (group 0) and IBEX35 (group 1) during the 61-day window period, I used the mean comparison t-test. The calculated t-value of -1.8049 (figure 9) is not statistically significant ($|t| < 1.96$), indicating that the mean difference in AR between Mapfre and IBEX35 is zero during the observed time period.

Figure 9: Mean comparison t-test. Comparation of the mean of AR of Mapfre S.A. to the mean AR of IBEX35

```
. ttest AR, by(Group) unequal

Two-sample t test with unequal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	61	-.0040869	.0018266	.014266	-.0077405	-.0004332
1	61	-.0000827	.0012592	.0098348	-.0026015	.0024361
combined	122	-.0020848	.0011196	.0123662	-.0043013	.0001317
diff		-.0040042	.0022186		-.0084024	.0003941

```
    diff = mean(0) - mean(1)                                      t =  -1.8049
Ho: diff = 0                     Satterthwaite's degrees of freedom =  106.523

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0370         Pr(|T| > |t|) = 0.0739          Pr(T > t) = 0.9630
```

Source: Own work

To compare the mean difference in AR between the five insurance companies (Admiral Group PLC, Aviva PLC, Prudential PLC, Legal & General Group PLC, and RSA Insurance Group PLC as group 0) and the FTSE100 (group 1) during the 61-day window period, I used the mean comparison t-test. The average AR for the five insurance companies was used as the AR variable for group 0. The calculated t-value of -0.6090 (figure 10) is not statistically significant ($|t| < 1.96$), indicating that the mean difference in AR between the five insurance companies and the FTSE100 is zero during the observed time period.

Figure 10: Mean comparison t-test. Comparison of the mean AR of five insurance companies (Admiral Group PLC, Aviva PLC, Prudential PLC, Legal & General Group PLC, and RSA Insurance Group PLC) to the mean AR of the FTSE100

```
. ttest AR, by(Group) unequal

Two-sample t test with unequal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	61	-.0002718	.0008177	.0063862	-.0019073	.0013638
1	61	.0003224	.0005322	.004157	-.0007423	.001387
combined	122	.0000253	.0004865	.0053741	-.0009379	.0009886
diff		-.0005941	.0009756		-.0025291	.0013408

```
    diff = mean(0) - mean(1)                                      t =  -0.6090
Ho: diff = 0                     Satterthwaite's degrees of freedom =  103.106

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.2719         Pr(|T| > |t|) = 0.5439          Pr(T > t) = 0.7281
```

Source: Own work

To compare the mean difference in AR between AXA S.A. (group 0) and the CAC40 (group 1) during the 61-day window period, I used the mean comparison t-test. The calculated t-value of 1.3475 (figure 11) is statistically not significant ($|t| < 1.96$), indicating that the mean difference in AR between AXA S.A. and the CAC40 is zero during the observed time period.

Figure 11: Mean comparison t-test. Comparison of the mean AR of AXA S.A. to the mean AR of the CAC40

```
. ttest AR, by(Groups) unequal

Two-sample t test with unequal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	61	.0012264	.0011391	.0088968	-.0010522	.003505
1	61	-.0007739	.0009519	.0074349	-.0026781	.0011302
combined	122	.0002262	.0007448	.0082261	-.0012482	.0017007
diff		.0020004	.0014845		-.0009398	.0049405

```
    diff = mean(0) - mean(1)                                      t =   1.3475
Ho: diff = 0                     Satterthwaite's degrees of freedom =  116.331

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9098         Pr(|T| > |t|) = 0.1804          Pr(T > t) = 0.0902
```

Source: Own work

Given the results of the previous tests on the statistical significance of the window period and the mean difference between the two groups, I chose to use one-way ANOVA to test the two research questions in this master's thesis. ANOVA is a statistical test used to compare the means of more than two groups. In this case, I used one-way ANOVA because my data consisted of one categorical independent variable (occurrence of terrorist attacks) and one quantitative dependent variable (ARs of insurance companies and capital markets).

The results of the first research question indicate that the independent variable (terrorist attack occurrence) has a statistically insignificant impact on the dependent variable (abnormal return) for all three capital markets (IBEX35 in Madrid, FTSE100 in London, and CAC40 in Paris). To test the changes in abnormal returns over the three time periods (before, during, and after the terrorist attack), I used a dummy variable for terrorist attack occurrence (DUMMY_terrorist attack). The dummy variable is defined with the following values:

- Before the terrorist attack occurred – marked in the database with "0"
- On the day when the terrorist attack occurred – marked in the database with "1"
- After the terrorist attack occurred – marked in the database with "2"

In this analysis, I have used the "abnormal return of the capital markets" variable as the dependent variable "Y", for each location separately, i.e., IBEX35 (figure 15 and figure 18), FTSE100 for London (figure 16 and figure 19), and CAC40 for Paris (figure 17 and figure 20), and "occurrence of terrorist attacks" as the independent variable "X" for all three cases. To begin with the interpretation of the results of this regression I looked at the p-values in all three cases testing the first research question for each capital market separately and made a conclusion based on those results.

My analysis of the effect of the terrorist attack begins with the p-value for Madrid terrorist attack in 2004 concerning the abnormal returns of IBEX35 during the given timeline of 61 days, which in this case is 0.1059 for the independent variable "occurance of terrorist attacks" and since 0.1059>0.05, this shows that the relationship between these two variables is statistically not significant, meaning that the occurance of terrorist attacks is not signifficantly impacting the abnormal returns of IBEX35 during this period of 61 days (figure 12). To illustrate the result from this testing in a simpler manner we can state that the terrorist attack in Madrid not impacted the fluctuations of the abnormal returns of IBEX35 in this period of 61 days. By looking at the regression solely, the results show that the occurance of the terrorist attack in Madrid in 2004 did not impact the fluctuactions of the abnormal returns of IBEX35.

Figure 12: One-way ANOVA. The association between the dependent variable "Abnormal returns of IBEX35" and the independent variable "occurance of terrorist attack"

```
. oneway AR OccOfterroristattack, tabulate
```

Occ. Of terrorist attack	Summary of AR Mean	Std. Dev.	Freq.
0	.00017171	.0067287	30
1	-.02069242	0	1
2	.00034994	.01182946	30
Total	-.00008267	.00983485	61

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	.000432318	2	.000216159	2.33	0.1059
Within groups	.005371136	58	.000092606		
Total	.005803453	60	.000096724		

```
Bartlett's test for equal variances:  chi2(1) =   8.6310  Prob>chi2 = 0.003

note: Bartlett's test performed on cells with positive variance:
      1 single-observation cells not used
```

Source: Own work

Turning our attention to the examination of the impact of the 2005 terrorist attack in London on FTSE100 throughout the specified timeline, I conducted an analysis involving the calculation of the average abnormal returns. These calculated averages were then utilized as the dependent variable in a regression analysis, as depicted in Figure 13. The p-value derived from this analysis for the independent variable "occurrence of terrorist attacks" is 0.0429. As this value is less than the conventional significance level of 0.05, specifically $0.0429 < 0.05$, it signifies that the occurrence of terrorist attacks does indeed have a statistically significant impact on the abnormal returns of FTSE100 during this 61-day period. Interpreting the regression findings in isolation, it is evident that the occurrence of the 2005 terrorist attack in London exerted an influence on the fluctuations observed in the abnormal returns of FTSE100 over the course of the analyzed period. This statistical insight contributes to a more nuanced understanding of the market dynamics following the unfortunate events, emphasizing the connection between such incidents and financial market performance.

Figure 13: The association between the dependent variable "Abnormal returns of FTSE100" and the independent variable "occurance of terrorist attack"

```
. oneway AR OccOfterroristattack, tabulate
```

Occ. Of terrorist attack	Summary of AR Mean	Std. Dev.	Freq.
0	.00093847	.00413883	30
1	-.00930496	0	1
2	.00002718	.0038657	30
Total	.00032237	.00415696	61

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	.000106687	2	.000053343	3.33	0.0429
Within groups	.000930132	58	.000016037		
Total	.001036819	60	.00001728		

```
Bartlett's test for equal variances:  chi2(1) =   0.1328  Prob>chi2 = 0.716

note: Bartlett's test performed on cells with positive variance:
      1 single-observation cells not used
```

Source: Own work

Concluding our examination, the analysis investigating the impact of the 2015 terrorist attack in Paris on CAC40 over the designated timeline reveals results akin to those observed in the Madrid case (refer to Figure 14). The p-value associated with this analysis is 0.6763 for the independent variable "occurrence of terrorist attacks." Given that 0.6763 is greater than the conventional significance threshold of 0.05, specifically 0.6763 > 0.05, it indicates that the relationship between these two variables lacks statistical significance. In essence, the occurrence of terrorist attacks is deemed statistically insignificant in its impact on the abnormal returns of CAC40 during this 61-day period. Interpreting these findings, the statistical insignificance suggests that the observed abnormal returns in CAC40 cannot be attributed to the occurrence of the terrorist attack in Paris during the specified timeframe. This nuanced understanding aids in discerning the distinct market dynamics surrounding different terrorist incidents and reinforces the importance of context-specific analyses in comprehending the multifaceted relationship between such events and financial market performance.

Figure 14: One-way ANOVA. The association between the dependent variable "Abnormal returns of CAC40" and the independent variable "occurance of terrorist attack"

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. oneway AR OccOfterroristattack, tabulate
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Occ. Of terrorist attack	Summary of AR Mean	Std. Dev.	Freq.
0	.00009117	.00628227	30
1	-.00211011	0	1
2	-.00159449	.00856553	30
Total	-.00077393	.00743489	61

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	.000044437	2	.000022218	0.39	0.6763
Within groups	.00327222	58	.000056418		
Total	.003316657	60	.000055278		

```
Bartlett's test for equal variances:  chi2(1) =   2.6971  Prob>chi2 = 0.101

note: Bartlett's test performed on cells with positive variance:
      1 single-observation cells not used
```

Source: Own work

In the second research question, I examined the association between the independent variable (terrorist attack occurrence) and the dependent variable (abnormal returns of insurance companies on the three capital markets separately: Mapfre S.A. for Madrid, Admiral Group PLC, Aviva PLC, Prudential PLC, Legal & General Group PLC, RSA Insurance Group PLC for London, and AXA S.A. for Paris). I created a dummy variable, DUMMY_terrorist attack, to test the changes in abnormal returns over the three time periods (before, during, and after the terrorist attack). The dummy variable is defined as follows:

- Before the terrorist attack occurred – marked in the database with "0"
- On the day when the terrorist attack occurred – marked in the database with "1"
- After the terrorist attack occurred – marked in the database with "2"

In this analysis, I used the abnormal return of the capital market as the dependent variable (Y) for each market separately (Mapfre S.A. for Madrid, Admiral Group PLC, Aviva PLC, Prudential PLC, Legal & General Group PLC, and RSA Insurance Group PLC for London, and AXA S.A. for Paris), and the occurrence of terrorist attacks as the independent variable (X) for all three cases. To begin interpreting the results of this regression, I examined the p-values in all three cases to answer the first research question for each capital market separately and drew conclusions based on those results.

To begin interpreting the results of the first analysis, I examined the p-value (0.9466) for the independent variable, occurrence of terrorist attacks, on the abnormal returns of Mapfre S.A. during the 61-day window period. Because the p-value is greater than 0.05, the relationship between these two variables is not statistically significant, meaning that terrorist attack in Madrid 2004 did not have a significant impact on the abnormal returns of Mapfre S.A. (see figure 15). In other words, the occurrence of terrorist attack in Madrid 2004 did not significantly affect the fluctuations of the abnormal returns of Mapfre S.A. during this 61-day period.

Figure 15: One-way ANOVA. The association between the dependent variable "Abnormal returns of Mapfre S.A." and the independent variable "occurance of terrorist attack"

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. oneway AR OccOfterroristattack, tabulate
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Occ. Of terrorist attack	Summary of AR Mean	Std. Dev.	Freq.
0	-.00462836	.01468832	30
1	-.00592624	0	1
2	-.00348406	.01430134	30
Total	-.00408686	.01426596	61

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	.000023081	2	.000011541	0.05	0.9466
Within groups	.01218798	58	.000210138		
Total	.012211061	60	.000203518		

```
Bartlett's test for equal variances:  chi2(1) =   0.0203  Prob>chi2 = 0.887

note: Bartlett's test performed on cells with positive variance:
      1 single-observation cells not used
```

Source: Own work

Moving on to the analysis of the occurrence of the 2005 terrorist attack in London on the abnormal returns of Admiral Group PLC, Aviva PLC, Prudential PLC, Legal & General Group PLC, and RSA Insurance Group PLC during the 61-day window period, the p-value for the independent variable, occurrence of terrorist attacks, is 0.4518. Because the p-value is greater than 0.05, the relationship between these two variables is not statistically significant, meaning that the occurrence of terrorist attack in London 2005 did not have a significant impact on the abnormal returns of the five insurance companies during this period (see figure 16).

Figure 16: One-way ANOVA. The association between the dependent variable "Average abnormal returns of Admiral Group PLC, Aviva PLC, Prudential PLC, Legal & General Group PLC, RSA Insurance Group PLC " and the independent variable "occurance of terrorist attack"

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. oneway AR OccOfterroristattack, tabulate
```

Occ. Of terrorist attack	Summary of AR Mean	Std. Dev.	Freq.
0	-.0005254	.0051049	30
1	-.00779323	0	1
2	.0002326	.00748594	30
Total	-.00027176	.0063862	61

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	.000066134	2	.000033067	0.81	0.4518
Within groups	.002380881	58	.00004105		
Total	.002447015	60	.000040784		

```
Bartlett's test for equal variances:  chi2(1) =   4.0799  Prob>chi2 = 0.043

note: Bartlett's test performed on cells with positive variance:
      1 single-observation cells not used
```

Source: Own work

Concluding our comprehensive analysis, the investigation into the repercussions of the 2015 terrorist attack in Paris on AXA S.A. throughout the 61-day observation window yields results consistent with the preceding cases. The p-value associated with the independent variable, "occurrence of terrorist attacks," stands at 0.9008. Given that this p-value exceeds the conventional threshold of 0.05, specifically $0.9008 > 0.05$, it denotes a lack of statistical significance in the relationship between the occurrence of the terrorist attack and the abnormal returns of AXA S.A. during this period. In essence, the statistical insignificance implies that the observed abnormal returns in AXA S.A. cannot be attributed to the occurrence of the 2015 terrorist attack in Paris within the specified timeframe. This finding contributes to a nuanced understanding of the unique market dynamics associated with different instances of terrorism, emphasizing the need for context-specific analyses to unravel the intricate relationship between such events and the financial performance of individual entities. Figure 17 visually captures these insights, providing a graphical

representation of the statistical insignificance in the impact of the Paris 2015 terrorist attack on AXA S.A.'s abnormal returns.

Figure 17: One-way ANOVA. The association between the dependent variable "Abnormal returns of AXA S.A." and the independent variable "occurance of terrorist attack"

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. oneway AR OccOfterroristattack, tabulate
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Occ. Of terrorist attack	Summary of AR Mean	Std. Dev.	Freq.
0	.00075333	.00769069	30
1	-.00025129	0	1
2	.00174877	.01019945	30
Total	.00122642	.00889679	61

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	.000017084	2	8.5418e-06	0.10	0.9008
Within groups	.00473209	58	.000081588		
Total	.004749173	60	.000079153		

```
Bartlett's test for equal variances:  chi2(1) =   2.2427  Prob>chi2 = 0.134

note: Bartlett's test performed on cells with positive variance:
      1 single-observation cells not used
```

Source: Own work

4.3 Discussion of results

In this master's thesis, I examined the effect of terrorist attacks on the stock price index of securities on the capital market and insurance companies listed on these markets. The results showed that the average abnormal returns and cumulative abnormal returns of Mapfre S.A. and IBEX35 index for Madrid attack in 2004, five listed insurance companies and FTSE 100 index for London attack in 2005 and AXA S.A. and CAC40 index for Paris attack in 2015 fluctuated in the observed timeframe. The findings showed that abnormal returns typically decreased on the day of the attacks or a few days later, and then returned to their pre-attack levels within 30 days (and were even higher in some cases on day 30). All one-way ANOVA tests used to analyze and answer the two research questions of this thesis were statistically insignificant at the 5% level, except for one test used to examine the relationship between the dependent variable (abnormal returns of the FTSE100) and the independent variable

(occurrence of terrorist attack), which was statistically significant at the 5% level. Based on the results of the regressions for both research questions, I concluded that the occurrence of terrorist attacks had a statistically insignificant impact on both the abnormal returns of the listed insurance companies on all three capital markets at the observed time period and the abnormal returns of the capital markets themselves (except for the FTSE100 for the London attack in 2005). This conclusion holds for all three event studies (the attack in Madrid in 2004, the terrorist attack in London in 2005, and the terrorist attack in Paris 2015 and their impact on the ARs of the insurance companies and the capital markets).

An analysis of the cumulative abnormal returns for the three terrorist attacks showed a negative relationship between the attacks and insurance company stock performance. To test the statistical significance of the event windows (-30;+30) for each attack and its impact on the insurance companies listed on the three capital markets (Mapfre S.A. for Madrid, Admiral Group PLC, Aviva PLC, Prudential PLC, Legal & General Group PLC, and RSA Insurance Group PLC for London, and AXA S.A. for Paris), as well as the statistical significance of the event windows for each attack and its impact on the three capital markets (IBEX35, FTSE100, and CAC40), I conducted the Pattel test in Excel. The Pattel t-test results showed a statistically significant negative impact only for the insurance company listed on IBEX35 in Madrid, indicating that the 2004 Madrid terrorist attack had a statistically significant negative impact on the returns of the insurance company listed on IBEX35 (i.e., Mapfre S.A.) during the 61-day window period. The remaining results for the insurance companies were not statistically significant, suggesting that other external factors may have also affected their stock returns over the 61-day window period (e.g., Admiral Group PLC, Aviva PLC, Prudential PLC, Legal & General Group PLC, RSA Insurance Group PLC for London, and AXA S.A. for Paris). The Pattel test results for the capital markets were also not statistically significant, suggesting that other external factors may have also affected their stock returns during the 61-day window period (e.g., IBEX35 in Madrid, FTSE100 in London, and CAC40 in Paris). One such external factor worth mentioning is that there are many other companies from different industries listed on these capital markets during the 61-day window period.

Additionally, I used the mean comparison test in STATA to test the statistical significance of the mean difference of the abnormal return (AR) variable between the two research groups: group 0 (insurance companies listed on the capital markets during the timeframe of interest) and group 1 (the capital markets during the same timeframe).

The mean comparison t-test results showed that the t-value was statistically insignificant, indicating that the mean ARs of the insurance companies listed on the three capital markets and the mean ARs of the capital markets were not different for the 61-day period.

Based on this analysis, I used one-way ANOVA regression to test the two research questions. This analysis revealed a statistically insignificant relationship between the independent variable (occurrence of a terrorist attack) and the dependent variable (abnormal returns of

the insurance companies for the first research question or abnormal returns of the three capital markets for the second research question) in all three cases. I used a dummy variable, DUMMY_terrorist attack, as the independent variable, divided into three parts: before the terrorist attack, on the day of the attack, and after the terrorist attack. For abnormal returns, five results showed a similar pattern: the relationship between the two variables in the one-way ANOVA tests was statistically insignificant at 5%, meaning that the occurrence of terrorist attacks had an insignificant impact on the abnormal returns of the insurance companies and the capital markets during this 61-day period. Only for the London attack in 2005 (FTSE 100) did, the one-way ANOVA test show a positive relationship between the two variables and significance at 5%.

CONCLUSION

The efficient market hypothesis, a classical theory in finance and investment, posits that stock prices promptly incorporate all available information, thereby precluding any investor from leveraging such information to generate abnormal returns, with the theory underscoring the role of signaling in aligning stock prices with available signals (MacKinley, 1999).

Insurance companies provide coverage for risks to the economy, financial institutions, corporate entities, and households, distinguishing their financial products by an inverse production cycle where premiums are collected at contract inception, and payouts are contingent on specified events, with insurers actively mitigating risks through diversification, risk pooling, and various strategies (Insurance Core Principles, 2015). Therefore, the primary business of insurance companies is to insure against risks to make a profit. Favorable financial performance is essential for efficient, fair, safe, and stable insurance markets that benefit and protect policyholders. Moreover, profit attracts investors and increases solvency, which strengthens consumer confidence (Burca & Batrinca, 2014). Furthermore, profit is essential for persuading policyholders and shareholders to provide capital to insurance companies.

Behavioral finance has challenged the supremacy of the efficient market hypothesis, which assumes that investors are rational and that stock prices reflect all available information. Behavioral finance suggests that investors are also influenced by irrational factors such as emotions and biases (Fama, 1965). This raises the question of whether investors are rational, irrational, or a combination of both. Graham (1973) argued that the stock market is a weighing mechanism in the long run, meaning that stock prices will eventually converge to their intrinsic values. I agree with this assessment and am skeptical that any "predictable patterns" in stock prices can be exploited to generate excess returns. Once a pattern is discovered and publicized, it is no longer predictable and is therefore unlikely to be profitable.

The relationship between terrorism and economic variables in London, Paris, and Madrid has been investigated in numerous studies, which have consistently found a negative correlation. This is particularly evident in the stock market performance, tourism sector, and foreign direct investments. In the Spanish markets, significant negative abnormal returns have been observed across most sectors following terrorist attacks. However, this effect has been less pronounced in London, and the market rebound has been much quicker. This may be due to the fact that the attackers in Spain were not suicide bombers, which may have led to a greater sense of fear and uncertainty among investors and consumers. Despite these findings, the overall evidence suggests that the impact of terrorism on economic variables is transitory and does not persist for a long period of time (Kollias, Papadamou & Stagiannis, 2011).

The principal aim of this master's thesis was to examine the influence of terrorist attacks on the stock performance of insurance companies within the European Union (EU) spanning the years 2004 to 2018, utilizing the event study methodology to assess the stock return dynamics during significant incidents that occurred in the United Kingdom, France, and Spain.

The event study methodology is a statistical technique used to measure the market's reaction to an event, such as a terrorist attack, a merger, or a new product announcement (Woon, 2004). The methodology involves comparing the stock prices of a group of affected companies to the stock prices of a group of control companies in the days leading up to and after the event.

In addition to the event study methodology, the thesis also employed analytical and empirical research to examine the determinants of stock performance of insurance companies and all potential factors affecting them, such as the type of capital market, the arrival of new information, and the predicaments of terrorist attacks.

The study's findings indicated that a definitive link between terrorist attacks and the stock performance of insurance companies in the EU could not be established. However, the thesis did find that there was a significant negative impact on the stock performance of insurance companies in the UK following the 2005 London attacks.

The study's findings should be interpreted with caution due to the following limitations. First, the study only examined a relatively small number of terrorist attacks. It is possible that the results would be different if a larger number of attacks were included in the analysis. Second, the results may not be generalizable to other attacks or to other countries. The impact of a terrorist attack on the stock market may vary depending on several factors, such as the severity of the attack, the location of the attack, and the type of insurance company. Third, the study did not control for other factors that may have affected the stock performance of insurance companies, such as the overall state of the economy or the performance of the

insurance sector as a whole. It is possible that these factors may have confounded the results of the study. Finally, the study did not examine the long-term impact of terrorist attacks on insurance company stock performance. It is possible that the negative impact of a terrorist attack on the stock market may persist for a longer period of time than was observed in the study. Despite these limitations, the study provides valuable insights into the impact of terrorist attacks on the financial markets. The study is particularly relevant in the current context, where the threat of terrorism remains high in many parts of the world.

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APPENDINCES

Appendix 1: Povzetek (Summary in Slovene language)

Borzni trgi, ključni elementi globalnega gospodarstva, služijo kot platforma za redno izmenjavo delnic javnih podjetij preko nakupovanja, prodaje in izdajanja. Ta trg, pogosto imenovan tudi tržišče lastniških vrednostnih papirjev, omogoča podjetjem in vlagateljem dostop do kapitalskih transakcij ter podeljuje zakonsko lastniško pravico. Obstajajo različne borzne lokacije, ki omogočajo transakcije z raznolikimi finančnimi instrumenti. Vlaganje v podjetje lahko prinese finančne dobičke preko dividend in deleža v uspešnosti podjetja, vendar prinaša tudi tveganje izgube v primeru padca vrednosti delnic.

Za oceno uspešnosti borznega trga se vlagatelji pogosto zatekajo k indeksom, kot je Dow Jones Industrial Average, ki vključuje najpomembnejša ameriška podjetja. Ti indeksi nudijo vpogled v trende na trgu, odražajoč spremembe znotraj trga. Pomembno je poudariti, da je borzni trg podvržen občutnim nihanjem, zlasti v razvijajočih se gospodarstvih, ki jih povzročajo različni ekonomski in neekonomski dejavniki, vključno s političnimi krizami, finančnimi težavami in predvsem terorističnimi dejanji.

Namen te disertacije je preučiti vpliv terorističnih napadov na borzno uspešnost zavarovalnic v Evropski uniji v obdobju od leta 2004 do 2018. Raziskava uporablja metodologijo študije dogodka, ki podrobno analizira odzive trga na pomembne dogodke, kot so združitve, prevzemi in napovedi. Dve glavni raziskovalni vprašanji vodita to raziskavo: prvič, ali teroristični napadi vplivajo na nenavadne donose na kapitalskem trgu, in drugič, ali ti napadi vplivajo na nenavadne donose specifičnih zavarovalnic.

Klasična finančna teorija učinkovitega trga predpostavlja, da se cene delnic hitro prilagajajo novim informacijam, kar preprečuje možnost nenavadnih donosov. Kljub temu uvedba vedenjske finance prinaša bolj prilagodljiv pristop k finančnemu odločanju, priznavajoč, da lahko vlagatelji kažejo tako racionalno kot iracionalno vedenje pri svojem odločanju.

Sklepna ugotovitev raziskave je, da obstaja negativna korelacija med terorizmom in ekonomskimi spremenljivkami v Londonu, Parizu in Madridu, vpliv na donose na borzi pa se izkaže za začasen, zlasti v primeru Londona. Nazadnje raziskava potrjuje opazno povezavo med terorističnim napadom v Londonu leta 2005 in borzno uspešnostjo zavarovalnic, ki poslujejo na kapitalskem trgu FTSE 100. Ta študija prispeva dragocene vpoglede v kompleksno medsebojno delovanje med terorizmom, finančnimi trgi in sektorjem zavarovalništva, razsvetljujoč subtilne dinamike, ki ležijo v osrčju teh ključnih sestavin globalnega gospodarstva.

Appendix 2: Paris attacks 2015, AXA S. A. insurance company ER, AR and CAR determination

Exchange Date	Stock	Returns	Expected return ER	Abnormal return AR	Cumulative abnormal return CAR
2. 10. 2015	CS. PA	0,0039	0,0084	-0,0045	-0,0045
5. 10. 2015	CS. PA	0,0407	0,0391	0,0016	-0,0028
6. 10. 2015	CS. PA	0,0109	0,0108	0,0001	-0,0027
7. 10. 2015	CS. PA	-0,0004	0,0020	-0,0025	-0,0052
8. 10. 2015	CS. PA	-0,0004	0,0024	-0,0029	-0,0081
9. 10. 2015	CS. PA	-0,0024	0,0064	-0,0088	-0,0169
12. 10. 2015	CS. PA	0,0053	-0,0025	0,0078	-0,0091
13. 10. 2015	CS. PA	-0,0191	-0,0101	-0,0090	-0,0181
14. 10. 2015	CS. PA	-0,0150	-0,0076	-0,0074	-0,0254
15. 10. 2015	CS. PA	0,0177	0,0161	0,0016	-0,0238
16. 10. 2015	CS. PA	0,0178	0,0069	0,0110	-0,0128
19. 10. 2015	CS. PA	0,0035	0,0007	0,0028	-0,0101
20. 10. 2015	CS. PA	0,0011	-0,0066	0,0077	-0,0024
21. 10. 2015	CS. PA	0,0079	0,0054	0,0024	0,0000
22. 10. 2015	CS. PA	0,0314	0,0253	0,0061	0,0061
23. 10. 2015	CS. PA	0,0097	0,0280	-0,0184	-0,0122
26. 10. 2015	CS. PA	0,0044	-0,0054	0,0098	-0,0024
27. 10. 2015	CS. PA	-0,0137	-0,0107	-0,0030	-0,0054
28. 10. 2015	CS. PA	0,0166	0,0102	0,0063	0,0009
29. 10. 2015	CS. PA	0,0058	-0,0006	0,0064	0,0073
30. 10. 2015	CS. PA	-0,0014	0,0031	-0,0045	0,0028
2. 11. 2015	CS. PA	0,0051	0,0046	0,0006	0,0034
3. 11. 2015	CS. PA	0,0035	0,0049	-0,0014	0,0020
4. 11. 2015	CS. PA	-0,0114	0,0031	-0,0145	-0,0125
5. 11. 2015	CS. PA	0,0045	0,0074	-0,0029	-0,0154
6. 11. 2015	CS. PA	0,0154	0,0013	0,0140	-0,0014
9. 11. 2015	CS. PA	-0,0105	-0,0155	0,0050	0,0036
10. 11. 2015	CS. PA	0,0045	0,0007	0,0038	0,0074
11. 11. 2015	CS. PA	0,0230	0,0094	0,0136	0,0210
12. 11. 2015	CS. PA	-0,0191	-0,0207	0,0016	0,0226
13. 11. 2015	CS. PA	-0,0107	-0,0105	-0,0003	0,0223
16. 11. 2015	CS. PA	0,0035	-0,0004	0,0039	0,0262
17. 11. 2015	CS. PA	0,0174	0,0306	-0,0133	0,0129
18. 11. 2015	CS. PA	-0,0006	-0,0063	0,0057	0,0186
19. 11. 2015	CS. PA	-0,0066	0,0023	-0,0089	0,0097
20. 11. 2015	CS. PA	0,0034	-0,0005	0,0039	0,0136
23. 11. 2015	CS. PA	0,0040	-0,0044	0,0084	0,0221
24. 11. 2015	CS. PA	-0,0177	-0,0149	-0,0027	0,0193
25. 11. 2015	CS. PA	0,0370	0,0169	0,0201	0,0394
26. 11. 2015	CS. PA	0,0077	0,0123	-0,0046	0,0348
27. 11. 2015	CS. PA	-0,0016	-0,0031	0,0015	0,0363

30. 11. 2015	CS. PA	0,0025	0,0065	-0,0040	0,0323
1. 12. 2015	CS. PA	0,0008	-0,0090	0,0098	0,0421
2. 12. 2015	CS. PA	-0,0057	-0,0015	-0,0042	0,0380
3. 12. 2015	CS. PA	-0,0402	-0,0386	-0,0017	0,0363
4. 12. 2015	CS. PA	0,0323	-0,0031	0,0354	0,0717
7. 12. 2015	CS. PA	0,0220	0,0101	0,0119	0,0837
8. 12. 2015	CS. PA	-0,0110	-0,0166	0,0056	0,0893
9. 12. 2015	CS. PA	-0,0100	-0,0099	-0,0001	0,0892
10. 12. 2015	CS. PA	-0,0012	-0,0001	-0,0011	0,0881
11. 12. 2015	CS. PA	-0,0232	-0,0197	-0,0035	0,0846
14. 12. 2015	CS. PA	-0,0213	-0,0179	-0,0034	0,0812
15. 12. 2015	CS. PA	0,0232	0,0349	-0,0117	0,0695
16. 12. 2015	CS. PA	-0,0049	0,0029	-0,0077	0,0618
17. 12. 2015	CS. PA	0,0224	0,0129	0,0095	0,0712
18. 12. 2015	CS. PA	-0,0056	-0,0117	0,0062	0,0774
21. 12. 2015	CS. PA	-0,0016	-0,0137	0,0121	0,0895
22. 12. 2015	CS. PA	-0,0072	0,0010	-0,0082	0,0813
23. 12. 2015	CS. PA	0,0139	0,0260	-0,0120	0,0693
24. 12. 2015	CS. PA	-0,0004	-0,0022	0,0018	0,0711
28. 12. 2015	CS. PA	-0,0064	-0,0101	0,0038	0,0748

Note: The data for AXA S. A index is from Thomson Reuters Eikon (2021c).

PARAMETERS

Intercept	0,0004
Slope	1,0902
R-square	0,7786
Standard error	0,0085

Appendix 3: Event day abnormal returns (AR) of stock of insurance companies for Madrid attack 2004, London attack 2005 and Paris attack 2015

Event day	Abnormal return Mapfre S. A. listed on IBEX35 in %	Abnormal return of London's insurance companies listed on FTSE100 in %	Abnormal return AXA S. A. listed on CAC40 in %
-30	-0,0230	-0,0020	-0,0045
-29	-0,0046	-0,0004	0,0016
-28	0,0105	-0,0013	0,0001
-27	-0,0034	0,0025	-0,0025
-26	0,0103	0,0000	-0,0029
-25	-0,0035	-0,0038	-0,0088
-24	-0,0029	0,0010	0,0078
-23	0,0198	0,0093	-0,0090
-22	-0,0095	0,0021	-0,0074
-21	0,0004	0,0018	0,0016
-20	-0,0024	0,0023	0,0110
-19	-0,0410	0,0040	0,0028
-18	0,0115	-0,0073	0,0077
-17	0,0113	0,0013	0,0024
-16	-0,0020	0,0086	0,0061
-15	-0,0059	0,0021	-0,0184
-14	0,0023	-0,0071	0,0098
-13	-0,0118	0,0030	-0,0030
-12	-0,0063	0,0014	0,0063
-11	0,0049	0,0042	0,0064
-10	-0,0318	-0,0092	-0,0045
-9	0,0256	-0,0139	0,0006
-8	-0,0058	0,0046	-0,0014
-7	-0,0017	0,0038	-0,0145
-6	0,0172	0,0084	-0,0029
-5	0,0008	-0,0092	0,0140
-4	-0,0026	0,0026	0,0050
-3	-0,0254	0,0002	0,0038
-2	-0,0338	0,0129	0,0136
-1	0,0026	-0,0203	0,0016
0	-0,0131	0,0135	**-0,0003**
1	0,0129	0,0202	0,0039
2	-0,0169	-0,0012	-0,0133
3	-0,0253	-0,0020	0,0057
4	0,0155	0,0010	-0,0089
5	-0,0343	0,0002	0,0039

6	-0,0112	-0,0102	0,0084
7	-0,0099	0,0036	-0,0027
8	0,0004	-0,0023	0,0201
9	0,0061	0,0015	-0,0046
10	0,0246	-0,0065	0,0015
11	-0,0159	-0,0071	-0,0040
12	-0,0196	0,0051	0,0098
13	-0,0186	0,0160	-0,0042
14	-0,0072	0,0022	-0,0017
15	0,0010	0,0028	0,0354
16	0,0210	-0,0027	0,0119
17	0,0288	0,0085	0,0056
18	-0,0105	0,0021	-0,0001
19	0,0165	-0,0014	-0,0011
20	0,0016	-0,0116	-0,0035
21	0,0174	0,0048	-0,0034
22	-0,0201	-0,0041	-0,0117
23	0,0026	0,0130	-0,0077
24	-0,0020	-0,0143	0,0095
25	-0,0021	0,0000	0,0062
26	0,0005	0,0011	0,0121
27	-0,0157	0,0036	-0,0082
28	0,0116	-0,0128	-0,0120
29	-0,0100	-0,0045	0,0018
30	-0,0032	-0,0003	0,0038

Note: The data for Mapfre S. A index, Admiral Group PLC index, Aviva PLC, Prudential PLC index, Legal & General Group PLC index, RSA Insurance Group PLC and AXA S. A index is from Thomson Reuters Eikon (2021a, 2021b & 2021c).

Appendix 4: Event day cumulative abnormal returns (CAR) of stocks of insurance companies for Madrid attack 2004, London attack 2005 and Paris attack 2015

Event day	Cumulative Abnormal return Mapfre S. A. listed on IBEX35 in %	Cumulative Abnormal return of London's insurance companies listed on FTSE100 in %	Cumulative Abnormal return AXA S. A. listed on CAC40 in %
-30	-0,0230	-0,0020	-0,0045
-29	-0,0276	-0,0025	-0,0028
-28	-0,0171	-0,0038	-0,0027
-27	-0,0205	-0,0013	-0,0052
-26	-0,0102	-0,0013	-0,0081
-25	-0,0136	-0,0052	-0,0169
-24	-0,0165	-0,0042	-0,0091
-23	0,0033	0,0051	-0,0181
-22	-0,0062	0,0073	-0,0254
-21	-0,0058	0,0090	-0,0238
-20	-0,0082	0,0113	-0,0128
-19	-0,0492	0,0153	-0,0101
-18	-0,0377	0,0079	-0,0024
-17	-0,0264	0,0093	0,0000
-16	-0,0285	0,0179	0,0061
-15	-0,0343	0,0200	-0,0122
-14	-0,0320	0,0129	-0,0024
-13	-0,0438	0,0159	-0,0054
-12	-0,0501	0,0173	0,0009
-11	-0,0452	0,0215	0,0073
-10	-0,0770	0,0123	0,0028
-9	-0,0514	-0,0016	0,0034
-8	-0,0572	0,0031	0,0020
-7	-0,0589	0,0069	-0,0125
-6	-0,0417	0,0153	-0,0154
-5	-0,0409	0,0061	-0,0014
-4	-0,0435	0,0086	0,0036
-3	-0,0689	0,0088	0,0074
-2	-0,1028	0,0217	0,0210
-1	-0,1002	0,0014	0,0226
0	**-0,1133**	0,0149	**0,0223**
1	-0,1004	0,0351	0,0262
2	-0,1173	0,0339	0,0129
3	-0,1426	0,0320	0,0186
4	-0,1271	0,0329	0,0097
5	-0,1614	0,0331	0,0136

6	-0,1726	0,0229	0,0221
7	-0,1825	0,0265	0,0193
8	-0,1820	0,0241	0,0394
9	-0,1759	0,0257	0,0348
10	-0,1513	0,0191	0,0363
11	-0,1673	0,0120	0,0323
12	-0,1868	0,0171	0,0421
13	-0,2054	0,0331	0,0380
14	-0,2125	0,0353	0,0363
15	-0,2116	0,0380	0,0717
16	-0,1906	0,0353	0,0837
17	-0,1618	0,0439	0,0893
18	-0,1723	0,0460	0,0892
19	-0,1558	0,0446	0,0881
20	-0,1542	0,0330	0,0846
21	-0,1368	0,0378	0,0812
22	-0,1569	0,0337	0,0695
23	-0,1542	0,0466	0,0618
24	-0,1563	0,0323	0,0712
25	-0,1583	0,0323	0,0774
26	-0,1578	0,0334	0,0895
27	-0,1735	0,0370	0,0813
28	-0,1619	0,0242	0,0693
29	-0,1719	0,0197	0,0711
30	-0,1752	-0,0166	0,0748

Note: The data for Mapfre S. A index, Admiral Group PLC index, Aviva PLC, Prudential PLC index, Legal & General Group PLC index, RSA Insurance Group PLC and AXA S. A index is from Thomson Reuters Eikon (2021a, 2021b & 2021c).

Appendix 5: Event day average abnormal return of stock price index of securities on the capital market for Madrid attack 2004 (IBEX35), London attack 2005 (FTSE100) and Paris attack 2015 (CAC40)

Event day	Abnormal return of index IBEX35 in %	Abnormal return of index FTSE100 in %	Abnormal return of index CAC40 in %
-30	-0,0106	0,0039	0,0047
-29	-0,0106	-0,0018	0,0066
-28	0,0013	-0,0004	0,0019
-27	-0,0003	-0,0045	0,0020
-26	-0,0111	0,0080	0,0024
-25	0,0070	-0,0017	0,0074
-24	0,0088	-0,0008	-0,0062
-23	0,0101	-0,0044	0,0042
-22	0,0047	0,0061	0,0036
-21	0,0020	-0,0051	0,0020
-20	0,0048	0,0001	-0,0066
-19	-0,0010	0,0030	-0,0020
-18	0,0008	0,0024	-0,0070
-17	0,0015	0,0003	-0,0008
-16	0,0022	-0,0060	0,0006
-15	0,0066	0,0025	0,0186
-14	-0,0134	0,0052	-0,0083
-13	0,0014	-0,0001	-0,0002
-12	-0,0104	0,0007	-0,0026
-11	0,0001	0,0024	-0,0049
-10	0,0014	0,0014	0,0037
-9	0,0066	-0,0052	0,0004
-8	0,0059	-0,0043	0,0018
-7	0,0056	0,0074	0,0109
-6	-0,0118	0,0022	0,0034
-5	0,0058	-0,0015	-0,0099
-4	0,0003	0,0103	-0,0069
-3	0,0050	0,0032	-0,0028
-2	-0,0065	0,0005	-0,0079
-1	-0,0005	0,0040	-0,0055
0	**-0,0208**	**-0,0093**	**-0,0021**
1	-0,0122	0,0103	-0,0030
2	-0,0397	-0,0029	0,0155
3	0,0165	-0,0049	-0,0055
4	0,0144	0,0051	0,0067
5	-0,0125	0,0018	-0,0030
6	0,0078	-0,0058	-0,0071

7	-0,0186	-0,0014	-0,0012
8	0,0042	-0,0036	-0,0111
9	-0,0037	0,0025	0,0056
10	0,0165	0,0003	-0,0018
11	0,0058	0,0045	0,0040
12	0,0099	0,0062	-0,0090
13	-0,0007	-0,0042	0,0025
14	0,0016	-0,0025	-0,0068
15	0,0087	0,0002	-0,0261
16	0,0173	0,0011	-0,0066
17	-0,0026	0,0016	-0,0075
18	-0,0001	0,0043	-0,0021
19	-0,0015	-0,0001	0,0006
20	0,0102	-0,0032	-0,0016
21	0,0032	0,0018	-0,0014
22	-0,0092	0,0038	0,0153
23	-0,0062	0,0038	0,0059
24	0,0085	-0,0008	-0,0043
25	-0,0063	-0,0009	-0,0069
26	0,0031	-0,0028	-0,0116
27	-0,0100	-0,0010	0,0059
28	-0,0010	-0,0052	0,0137
29	0,0048	-0,0032	-0,0019
30	0,0031	-0,0038	-0,0049

Note: The data for IBEX35 index, FTSE100 index and CAC40 index is from Thomson Reuters Eikon (2021d, 2021e & 2021f).

Appendix 6: Event day cumulative abnormal return of stock price index of securities on the capital market for Paris attack (IBEX35), London attack (FTSE100) and Paris attack (CAC40)

Event day	Cumulative Abnormal return of index IBEX35 in %	Cumulative Abnormal return of index FTSE100 in %	Cumulative Abnormal return of index CAC40 in %
-30	-0,0106	0,0039	0,0047
-29	-0,0212	0,0022	0,0113
-28	-0,0199	0,0017	0,0133
-27	-0,0203	-0,0028	0,0153
-26	-0,0313	0,0052	0,0177
-25	-0,0243	0,0035	0,0251
-24	-0,0156	0,0027	0,0189
-23	-0,0054	-0,0017	0,0231
-22	-0,0008	0,0045	0,0266
-21	0,0013	-0,0006	0,0286
-20	0,0060	-0,0005	0,0220
-19	0,0051	0,0026	0,0200
-18	0,0059	0,0050	0,0130
-17	0,0074	0,0053	0,0122
-16	0,0096	-0,0007	0,0129
-15	0,0162	0,0019	0,0315
-14	0,0028	0,0071	0,0233
-13	0,0042	0,0070	0,0230
-12	-0,0062	0,0077	0,0204
-11	-0,0060	0,0101	0,0156
-10	-0,0047	0,0115	0,0193
-9	0,0020	0,0063	0,0196
-8	0,0078	0,0020	0,0215
-7	0,0134	0,0094	0,0323
-6	0,0017	0,0116	0,0357
-5	0,0074	0,0100	0,0258
-4	0,0078	0,0204	0,0189
-3	0,0128	0,0236	0,0162
-2	0,0062	0,0241	0,0082
-1	0,0057	0,0282	0,0027
0	**-0,0150**	**0,0188**	**0,0006**
1	-0,0273	0,0292	-0,0024
2	-0,0670	0,0263	0,0132
3	-0,0506	0,0214	0,0076
4	-0,0361	0,0265	0,0143
5	-0,0486	0,0283	0,0113

6	-0,0408	0,0225	0,0042
7	-0,0595	0,0211	0,0030
8	-0,0553	0,0175	-0,0081
9	-0,0590	0,0199	-0,0025
10	-0,0424	0,0202	-0,0043
11	-0,0367	0,0248	-0,0003
12	-0,0267	0,0310	-0,0093
13	-0,0275	0,0268	-0,0068
14	-0,0258	0,0242	-0,0136
15	-0,0171	0,0245	-0,0397
16	0,0002	0,0255	-0,0463
17	-0,0024	0,0271	-0,0539
18	-0,0025	0,0314	-0,0560
19	-0,0040	0,0313	-0,0554
20	0,0062	0,0280	-0,0570
21	0,0094	0,0298	-0,0584
22	0,0002	0,0336	-0,0431
23	-0,0060	0,0374	-0,0372
24	0,0025	0,0366	-0,0415
25	-0,0038	0,0357	-0,0485
26	-0,0007	0,0329	-0,0601
27	-0,0107	0,0318	-0,0541
28	-0,0117	0,0266	-0,0404
29	-0,0069	0,0235	-0,0423
30	-0,0038	0,0197	-0,0472

Note: The data for IBEX35 index, FTSE100 index and CAC40 index is from Thomson Reuters Eikon (2021d, 2021e & 2021f).