



Journal of Economic Analysis

Homepage: <https://www.anserpress.org/journal/jea>



The Effect of Public Contract Winning Announcements on Share Prices: An Event-Based Study on the Pharmaceutical Industry

Eyden Samunderu ^a, Anita Yordanova ^{a,*}

^aInternational School of Management – (ISM), Dortmund, Germany

ABSTRACT

The purpose of this paper is to examine and elucidate the effect of the announcement of winning a US federal contract by pharmaceutical companies, traded on the NASDAQ stock exchange on the share prices. The analysis is based on a sample of 327 event days from 12 pharmaceutical companies listed on the NASDAQ market for a given period (2010 – 2021). The sample is analysed by using the event study methodology and Capital Asset Pricing Model (CAPM) in order to examine the abnormal returns and cumulative abnormal returns during an event window of 10 days before the event and 10 days after the event. While prior researchers have identified significant positive abnormal returns following different types of contract announcements, this study aims to contribute to the existing literature by exploring the specific impact of the public contract in the pharmaceutical market on market shares. By investigating this unique aspect, the research fills a gap in previous studies and enhances our understanding of the relationship between public contract announcements and market performance. The data collection utilises secondary data from the official open data source of US federal spending information and daily stock prices. The collected data is analysed quantitatively using event study methodology, allowing for statistical examination of abnormal returns, such as ANOVA analysis, t-statistic, beta index, time series analysis and linear regression. The research findings indicate a significant impact of public contract-winning announcements on cumulative abnormal returns, suggesting a positive reaction from the market. However, average abnormal returns within the event window were positive but not statistically significant. These results imply that winning a government contract has a limited impact on the stock market. The implications of this research highlight the importance of public contract announcements in the pharmaceutical industry and their influence on share prices. The findings provide valuable insights for investors and stakeholders, aiding decision-making processes related to investment opportunities and market performance.

KEYWORDS

Public contract winning announcement; Stock market; Pharmaceutical industry; Event study; Abnormal returns; Capital Asset Pricing Model (CAPM); NASDAQ market; Share prices; Investor behaviour

* Corresponding author: Eyden Samunderu
E-mail address: eyden.samunderu@ism.de

ISSN 2811-0943

doi: 10.58567/jea03010001

This is an open-access article distributed under a CC BY license
(Creative Commons Attribution 4.0 International License)



Received 2 June 2023, Accepted 15 June 2023, Available online 6 July 2023, Version of Record 15 March 2024

1. Introduction

The stock markets are extremely responsive to any information released concerning the industry, economy, news, financial crises, and social or environmental issues. Markets react to both positive and negative information. This is frequently the consequence of an investor's desire to maximise their wealth and an evaluation of how this news will affect future cash flows. Investors consider current news, the company's financial performance, and market reputation to make investment selections (Parveen, 2020).

Disclosure of companies receiving government contracts signals to the financial market that the organisation has favourable opportunities for investment. Positive stock price changes are rapidly indicated when there is a projection for future cash flow increases. If a firm secures government contracts, it is generally perceived as a positive development. As a result, the capital markets are expected to react positively to such news, with the potential for future cash flow being incorporated into their stock prices in a timely manner, assuming that the capital market is efficient (Elayan Pukthuanthong & Li, 2011).

Contracts with the government are an essential source of reliable revenue and an instrument for reducing the potential of competitors. This is because the government is often the largest consumer in a given country, spending a higher proportion of total sales. It is not unexpected that the acquisition of new government contracts is highly valued in the market, as evidenced by previous studies (Capelle-Blancard & Couderc, 2008; Diltz, 1990; Larson & Picou, 2002). This is owing to the fact that government contracts frequently provide a stable source of income and may strengthen the credibility of a business. Furthermore, winning a government contract can lead to increased opportunities for future contracts and partnerships (Abdurakhmonov, Ridge & Hill, 2021).

Despite the acknowledged importance of government contract-winning announcements, there remains a need to investigate their specific impact. Therefore, the objective of this study is to examine what is the effect of public contract-winning announcements on the share prices of pharmaceutical companies. Based on prior research and existing literature, we state the primary hypothesis of this research that such announcements lead to a positive impact on stock prices. By exploring this relationship, we aim to contribute to the existing literature on the dynamics between public contract announcements and stock market reactions. We can enhance our understanding of investor behaviour, market efficiency, and the informational content conveyed by such announcements.

2. Literature Review

The pharmaceutical industry is a complex and constantly evolving sector that is significantly impacted by various external factors, including government contracts. When pharmaceutical companies secure government contracts, it often leads to significant developments in their operations, research, and financial performance. Consequently, the announcement of winning a government contract can have a profound impact on the company's shares and stock prices. Understanding the relationship between public contract announcements and market dynamics is essential for investors and stakeholders.

In the field of finance, the Efficient Market Hypothesis (EMH) proposed by Fama (1970) has provided a framework for analysing the efficiency of financial markets. According to the EMH, stock prices fully reflect all available information. While the EMH provides valuable insights into market efficiency, it is crucial to examine its applicability in specific industries such as pharmaceuticals. The unique characteristics of this market, including its sensitivity to regulatory changes, technological advancements, and government contracts, justify a deeper investigation into the relationship between public contract announcements and market performance. By exploring this specific aspect, researchers can shed light on the market dynamics surrounding government contracts in the pharmaceutical industry.

Previous studies have examined the impact of contract announcements on stock prices, with several

researchers reporting significant positive abnormal returns following various types of contract announcements. This literature review aims to synthesise and analyse existing research on the relationship between public contract announcements and market performance. Furthermore, it will provide a foundation for the empirical analysis conducted in this study.

2.1. Efficient market theory

Fama (1970) introduced the Efficient Market Hypothesis (EMH), which defines the stock market as an environment where all available information is fully reflected in stock prices. According to this concept, when new information such as a dividend announcement, annual report, earnings release, political issues, or economic policies enters the market, stock prices rapidly assimilate it and change appropriately (Shafiq, 2022). According to Fama (1970), we can indicate three primary forms:

- *Weak form*: since share prices represent previous price levels, it is not feasible to generate a prediction in order to anticipate future prices. As a result, abnormal returns cannot be obtained using this historical information, and unique information may assist investors in gaining abnormal returns.
- *Semi-strong form*: since all public information about the corporations is absorbed by the market, no abnormal return can be obtained. Other information, such as annual reports and financial statements, is publicly available, and all investors have equal access to it, making it impossible for investors to gain from it.
- *Strong form*: since stock prices represent all publicly available information, abnormal returns are equivalent to zero. Rates are already adjusted based on the most recent information, so investors can make significant profits only if they have access to any confidential information that is not publicly available.

For the analysis of government contract announcements in this study, a semi-strong form of market efficiency is adopted. This means that the market should quickly absorb any public information, including contract announcements, influencing stock price movements on or around the day of the announcement.

There are also various types of companies' public releases, such as initial public offerings (IPOs), changes in corporate structure, mergers and acquisitions (M&As), dividends, accounting, financial and internal information, and, most importantly, disclosure of contracts. All of that information could have an impact on share prices, especially if they are seen as a positive investment opportunity for investors (Neuhierl, Scherbina, & Schlusche, 2013). Consequently, the announcement of winning a public contract would be a sign of positive and stable cash flows that impact the market capitalisation and the investor's decision to make the investment (Elayan, Pukthuanthong, & Li, 2011).

2.2. Contract announcement studies

Neoclassical economic theory posits that the shareholders of a publicly traded firm are its rightful proprietors. This statement implies that the primary objective of the firm's management should be to enhance the economic prosperity of the shareholders. The fundamental components of managing public companies entail persistent endeavours to secure contracts. The fundamental concerns of the stock market are typically a company's performance, particularly its profit margins, as evidenced in financial statements and cash dividends. Shareholders often expect some type of financial remuneration for holding firm shares. To meet this goal, management at the corporation must make strategic investment and bidding decisions for specific projects.

The act of participating in a bidding process and ultimately securing a contract may yield favourable outcomes for a company's performance and the value of its shares. This is determined by the company's financial performance and the corresponding response of its stock prices. In various industry sectors, contract acquisition is crucial. Previous studies have examined the stock market reaction to contract announcement that generates favourable cash

flows and increased earnings, as it is expected to yield positive outcomes for the company and its stakeholders.

The findings of Elayan, Pukthuanthong, & Li (2004) indicate that significant contract announcements have an impact on the behaviour of the United States stock market. The research presents the existence of anomalous returns in the equity of contract holders during the announcement time. Moreover, the magnitude of the market response to the announcement of a contract is influenced by the size of the firm. A smaller firm size is associated with a greater market reaction. This suggests that in cases where a relatively smaller firm secures a contract that is larger in scale, the market perceives such a declaration as conveying information that is asymmetric in nature (Elayan et al., 2004)

Further research by Elayan, Pukthuanthong, & Roll (2006) focuses on analysing the abnormal returns during the announcement period of contractors and contractees within a narrow period surrounding the business contract announcements. The study reveals that winning contractors have noteworthy and substantial abnormal increases in their stock prices, accompanied by abnormally high trading volume (Elayan et al., 2006).

The study by Choi (2014) examines the impact of contract announcements on the market valuation of companies within the construction sector. This study examines a comprehensive set of 377 contracts / provided by government and nongovernmental entities/ that were granted to contractors from Korea during the period spanning from 2000 to 2010. The standard event study methodology is utilised to estimate cumulative abnormal returns (CARs) in order to assess the overall level of project success and to make comparisons between groups that are classified based on project characteristics. The findings suggest that contract announcements are typically associated with a positive response from the stock market (Choi, 2014).

Based on the analysis conducted by Yang, Lu, & Zhou (2014), it was determined that contract announcements have a statistically significant and positive impact on the stock market. Specifically, the announcement of sales contracts resulted in more positive stock reactions compared to the announcement of purchasing contracts. The identification of the prospective profit of a supplier through sales contracts promotes greater confidence in investors regarding the supplier's profitability. The study has concluded that the size of the firm and the debt-to-equity ratio have a significant impact on the market's response to contract announcements. The market's response to contract announcements tends to be more favourable for larger firms compared to smaller ones (Yang et al., 2014).

The study conducted by Karakuş (2017) examines the impact of press releases announcing contract wins on the market value of firms listed on the Istanbul Stock Exchange. The research focuses on a sample of 112 contracts between 2011 and 2016, with emphasis on the size of the contracts. The Author arrives at the conclusion that notable positive cumulative abnormal returns exist within a day before and following the announcement date. Nevertheless, the researcher observed noteworthy adverse abnormal returns during a period of two days before and two days after the disclosure. Consequently, the research findings suggest that investors have the potential to achieve returns that exceed their expected returns. Furthermore, the size of the contract also exerts an influence. An increase in contract size leads to a corresponding increase in abnormal returns (Karakuş, 2017).

Furthermore, there are explicit studies investigating the government contract award announcement, resulting in positive abnormal returns. It would be beneficial to examine the historical context of previous research papers (Table 1).

Such as the event analysis of Diltz (1990), which examines the effects of contract announcements when large government procurement contracts are awarded to winning firms using data from the US Department of Defence from 1981 to 1985. The finding revealed that investors hold a positive perception toward the allocation of large government procurement contract awards at a fixed price. The study presents a theoretical discourse indicating that the favourable response of investors to the fixed price contract awards can be attributed to their perception of the award as a positive indication of the company's future outlook. Investors may endeavour to construe non-

Table 1. Synopsis table.

Contract Announcement Studies			
Authors	Type of Announcement	Methodology	Findings
Diltz, 1990	Government Contract	Event study (± 15); CAR; Market model	According to the statistical analysis, beneficial investor reaction to fixed-price contract awards is due to investors' interpretation of the award as a good signal about the firm's future prospects.
Larson, 2002	Government Contract and Business Contract	Event study (-3, 5), market model	Contract returns awarded by foreign governments are far greater than contract returns granted by American governments or enterprises.
Elayan, 2004	Business Contract	Event study (± 10); Market model; Tobin's q ratio	The US stock market is reacting to large contract announcements.
Elayan, 2006	Business Contract	Event study (± 5); Market model	We discover that winning contractors have considerable and significant anomalous stock price returns as well as unusually high volume.
Elayan, 2011	Government Contract	Event study (± 1)	Government contract award announcements have a considerable beneficial influence on the market price of the winning businesses. According to the aggregate market impact, receiving government contract awards represents a value-added commercial exchange for company investors.
Lonkani, 2012	Government Contract and Business Contract	Event study ($t \pm 25$), ($t \pm 10$), ($t \pm 3$), CAPM and Market model	The overall findings indicate that securing company contracts provides important information to the market.
Choi, 2014	Business Contract	Event study (± 2); Market model	The stock market often responds positively to new contracts when evaluating the overall degree of project success. Furthermore, during economic upturns, the stock market is more likely to respond positively to new agreements than during economic downturns.
Yang, 2014	Business Contract	Event study	Contract announcements by larger corporations cause more favourable market reactions than those by smaller firms.
Karakus, 2017	Contract Winning Announcement	Event study (± 10), CAPM	The findings of the analysis show that announcements with a larger contact size result in greater anomalous returns in wider event windows.

Source: Authors own compilation.

financial determinations as indications of a company's forthcoming opportunity. More significantly, the study reveals that the information, once disclosed to the market, is immediately incorporated into the stock price of the firm (Diltz, 1990).

The study conducted by Larson & Picou (2002) analysed the effects of contract-winning announcements on the stock prices of companies listed on the New York Stock Exchange, the American Stock Exchange, or the NASDAQ. The data set for the study utilising the event study methodology comprised 329 announcements. The study yielded positive and statistically significant abnormal returns within the event windows of (0, +1) and (+2, +5). Furthermore, the study compares anomalous returns based on whether the tender is organised by public or private companies. Research has indicated that companies that are awarded government contracts tend to experience greater abnormal returns on their shares (Larson & Picou, 2002).

The research of Elayan, Pukthuanthong, & Li (2011) reveals that public companies awarded with government contracts will likely have considerable profit growth in the future. If so, investors should respond favourably to news

of businesses getting federal contracts, accumulating a positive anomalous return around the announcement date. This led to the theory that a company's efforts to participate in government contracting are connected with more economic advantages in the future and, subsequently, a higher market value. The concept of aggregate market effect assumes that receiving government contract awards constitutes a beneficial decision for the shareholders of a firm. Moreover, the study presents evidence indicating that services contracts generate abnormal returns that are higher than those of non-services contracts after their announcement (Elayan et al., 2011).

The findings of Lonkani, Changchit, & Satjawathee (2012) indicate that there is a positive correlation between the release of news regarding the winning of contracts and subsequent increases in stock prices. The impact of the announcement on stock prices is influenced by the presence of various types of contracts. Both government and corporate contracts determine the stock returns during the announcement period ($t \pm 3$). Nevertheless, the impact of the corporate project announcement persists for a longer duration. However, the findings of this research contribute support to the concept that the market incorporates winning government contract announcements more effectively than corporate contract announcements (Lonkani et al., 2012). Their study reveals that business contract announcements yield positive effects on stock returns, both on and after the event date. The findings also present interesting suggestions that corporate and small-size announcements show higher cumulative abnormal returns relative to the cumulative abnormal returns on governmental and larger size contract announcements.

2.3. Capital Asset Pricing Model (CAPM)

Previous studies related to the contract announcement effect on the share prices have based their event study methodology on the Market Model (Diltz, 1990; Elayan et al., 2011; Larson & Picou, 2002; Lonkani et al., 2012, Choi, 2014). However, given the study of Pettit (1974), performance indicators that rely on the validity of the market model contain significant biases that seem to be related to the degree of risk in the specific portfolio under consideration. Therefore, it was decided that the best method to adopt for this paper is the Capital Asset Pricing Model since the paper aims to analyse the effect of the award proclamation on share prices on daily return and based on the previous studies related to the contract announcement effect (Karakuş, 2017; Lonkani, 2012).

The Capital Asset Pricing Model (CAPM) is a linear equilibrium model that estimates capital asset returns based on Markowitz's modern portfolio theory, which was further developed by William F. Sharpe (1964). According to Rossi (2016), the CAPM continues to have a wide range of applications for determining a company's cost of capital and the expected returns that investors expect on their asset investments. The model evaluates asset risk through an asset's covariance with overall market returns by highlighting the relationship between an asset's returns and its associated risks. The basic premise of the CAPM assumes a linear relationship between the expected return on any two assets and the covariance of those returns with the returns of the market portfolio. The model's acceptance comes from its ability to make accurate and appealing predictions about how risk is measured and how expected returns and risk interact. Furthermore, the objective character of the CAPM when evaluating equity costs gives financial managers the ability to combine it with other methods and their own judgment to create calculations of equity costs that are feasible and beneficial (Rossi, 2016).

To assess the risk of individual securities and portfolios in relation to the overall market, the CAPM model introduces a measure of systemic risk known as the beta value. This value indicates the sensitivity of changes in security returns to changes in the market portfolio's return (Džaja & Aljinović, 2013). Moreover, the model is built on a series of fundamental assumptions that must be taken into account.

2.4. Impact of the Announcement on share price

The impact of a firm's announcements on share prices can be defined through two distinct approaches. Announcements concerning companies suppose significance for investors when forecasting future cash flows. The

Table 2. Assumptions of the CAPM model.

Assumption	Description
1. Maximising Utility	All buyers take place on the efficient frontier, which is the line where all assets maximise utility. Investors do not like taking risks and are only concerned about their gain and the risk that comes with it.
2. Borrow or Lend Funds	Investors can borrow or give any amount of money without taking on any risk.
3. Homogenous Expectations	All buyers have the same hopes, which means they all think that future rates of return will be spread out in the same way.
4. Same Investment Period	All investors hold investments for the same period.
5. Buy or Sell Portions	Investors can buy or sell parts of the shares they own in any asset or account they have.
6. No Taxes or Transaction Costs	Investors do not have to pay taxes or fees.
7. No Inflation or Change in Interest Rates	There is no inflation, and the loan rates do not change.
8. Capital Market Equilibrium	The capital markets are in balance, and the prices of all assets are fair. Investors cannot change prices.

Source: The authors' assessment based on Džaja & Aljinović (2013); Elbannan (2015).

estimation of the actual value of shares is contingent upon the present value of future cash flows, and as such, any variations in the data will have a direct impact on the estimation of the actual value. The impact of actual value estimates on market prices is manifested through their influence on demand. The second statement posits that market prices are impacted by related announcements through their influence on the psychology of investors. The notion that all investors exhibit rational behaviour is a prevalent phenomenon in numerous markets. However, in reality, some of the investors engage in conduct that deviates significantly from rationality. Investors of this nature tend to invest based on their personal biases without conducting a thorough analysis of the economic, social, and political events occurring both domestically and globally. They may fail to calculate the true value of stocks and neglect to perform basic analytical procedures. Psychological factors are considered to be of utmost significance for these investors when it comes to influencing their investment decisions. Investors are capable of formulating investment decisions based on favourable or unfavourable information about a company (Karakuş, 2017).

According to Rule 5200 of the NASDAQ stock market, listed companies are required to provide any important information that might impact the value of their securities or influence investor decisions (NASDAQ, 2012). Through comprehending the various categories of information and procedures, an investor can attain a more lucid understanding of the consequences of corporate action on a company's financial matters and the significant influence on the company's stock value and overall performance. This information can assist the investor in making decisions regarding the purchase, sale, or retention of the relevant stock.

Previous researchers found that any kind of information examined has an impact on the announcement, such as E-business outsourcing (Agrawal, Kishore, & Rao, 2006); corporate credit agreements (Fery, Gasbarro, Woodliff, & Zumwalt, 2003); international joint venture announcement (Hanvanich, & Çavuşgil, 2001); buyback announcement (Kumar Pradhan & Kasilingam, 2016); merger announcements (Rosen, 2006); corporate crime announcement (Song & Han, 2017). The impact of information disclosure on stock market success can vary depending on the perception of investors. While it can be beneficial for some companies, it may also lead to a loss of trust and fluctuations in stock prices. Ultimately, the decision to disclose information should be carefully considered by companies in order to maintain investor confidence and promote long-term success.

One of the most discussed topics in the literature around the impact of the announcement on stock prices is dividend disclosures. Previous studies found significant abnormal returns depending on the increase or decrease of the dividends (Asamoah & Nkrumah, 2010; Dasilas & Leventis, 2011; Dedunu, 2018; Gupta, Dogra, Vashisht & Ghai, 2012; Gurgul, Mestel, & Schleicher, 2003). One of the most significant market responses concerns the dividend announcement (Neuhierl et al., 2013). This is a consequence of the investors' desire to expand their wealth and

earnings through diverse financial instruments, culminating in dividends that are determined by the company's financial performance and cash flows.

It is widely believed that financial information related to a company plays a crucial role in assessing the value of its stock prices. However, various studies have investigated the impact of earnings announcements and found inefficiencies in the timely integration of earnings information. (Afego, 2011; Firth, 1976; Owusu, Gyau & Amaning, 2016; Syed & Bajwa, 2018). Before the public announcement, the capital market generates anticipations and assumptions regarding declared news releases. The market demonstrates a response to unforeseen statements of a company's earnings that deviate from the projected profits of the market (Syed & Bajwa, 2018). However, the financial outcomes of one company could provide an overall understanding of the specific industry (Firth, 1976).

Conversely, announcements associated with new financing issues suggest a favourable correlation between pre-announcement revenue expansion and anomalous returns. It seems that investors react more positively to equity issues from firms that have previously demonstrated earnings growth, presumably under the assumption that such progress is likely to continue into future growth prospects (Burton, Lonie & Power, 2000).

According to Neuhierl et al. (2013), an increase in unusual volatility results in a decrease in the attraction of a firm's equity as a means for acquisitions and stock-based employee compensation. Additionally, it increases the conflict of interest between bondholders and stockholders (Neuhierl et al., 2013).

The analysis of the impact of the Employee Stock Ownership Plans (ESOPs) with a low proportion of newly issued shares indicates favourable insights into the equity market, while a large percentage of newly issued shares has an adverse influence. ESOPs that were aimed at all employees were found to have greater effects as opposed to ESOPs that were targeted specifically at management or key personnel. The observed outcomes may be related to the comparatively higher mean quantity of shares related to the potential threat of free rider difficulties (Ikäheimo, Kjellman, Holmberg & Jussila, 2004). A similar study about stock option plans reveals significantly positive abnormal returns on the day of the announcement (Langmann, 2007).

On the other hand, the layoff announcement revealed unfavourable market outcomes. In the United States, one layoff press release has been associated with more negative returns than multiple announcements. Furthermore, the impact on stock prices is more negative when a larger proportion of the company's employees are affected by the layoffs. The widespread distribution of numerous announcements could potentially indicate that companies are encountering significant challenges and have been incapable of sufficiently adapting to the competitive landscape. The market perceives these announcements of layoffs as an indicator of underlying issues concerning the firm's future performance (Lee, 1997)

The management is not subject to negative implications from the stock market when implementing carefully planned, long-term strategic choices. Indeed, it provides incentives for their actions (Woolridge & Snow, 1990). However, these decisions are not always perceived by the market as good business action and respectfully this has an impact on the shares.

3. Methodology

The current study is based on an event study methodology. This approach is adopted widely in finance analysis and similar papers investigating the impact on share prices. Event studies, particularly those on daily returns, provide the clearest evidence of market efficiency. When an information event can be accurately timed and has a significant impact on pricing. Therefore, event studies may provide a clear picture of the rate at which prices fluctuate in response to information (Fama, 1991). Adopting an event-based study as a methodology to analyse financial behaviour in capital markets, allows our study to follow the logic from Sorescu, Warren & Ertekin (2017). Furthermore, it allows us to assess the extent to which investors can earn excess or abnormal stock returns from an event that carries informational content when an abnormal return is "the difference between the observed return

and the return expected in the absence of the event, predicted by an appropriate benchmark asset pricing model". Subsequently, stock prices will respond because of such an announcement. The key assumption of the event study methodology adopted in this study shows that the market is efficient. Thus, given an efficient capital market, the effects of the events we observed were reflected immediately in the stock prices of the pharmaceutical companies in our sample study.

3.1. Data Collection and Sample

The paper examines government contract announcements over the period of 2010 to 2021. The sample is gathered electronically from the official open data source of the US federal spending information website, as the contract amount exceeds 100 000 USD. Because it was found in a prior study that the value of the contract also has an effect on abnormal returns, we define the contract's price criteria (Karakuş, 2017). We assume this parameter will provide more relevant and accurate results. Given the premise that the change in share prices is determined by the perceptions and behaviour of investors, establishing parameters for the size of the contract will allow us to explore the volatility in the securities.

All of the previous research studies use event study methodology for analysing the abnormality of the announcement. Therefore, we state that the event day is the announcement day. For the purpose of the paper, we assume that the disclosure day is the action day of the contract, referring to FAR, 48 CFR § 5.303 (2014). The article states that the contracting officers shall make information on the award available on the day of the award and there should be a local announcement in the local press or other media (FAR, CFR 48, §5.303, 2014). Furthermore, on the official open data source of federal spending information, it is pointed out that the awards are published daily (United States, n.d.). As a result, it is assumed that the information is publicly available to every third party.

Moreover, we are focusing only on pharmaceutical companies, traded on NASDAQ. We set criteria regarding the time frame. Our sample consists of companies that are listed on the market from 2010 to 2021. This period is appropriate because it will yield accurate results, taking into account the variety of market fluctuations for 11 years. In addition, the same time frame is set for the awards, since we can analyse a large sample of contract volume.

Given the above limitations, we collect only secondary data, which is already published and available for every third party:

- Contract announcements and contract details are obtained from the official open data source of federal spending information.
- Daily stock prices around contract announcements of the winning companies, collected from the database of Yahoo! Finance.

3.2. Data Analysis

The research topic assumes the application of the quantitative research design. We are collecting secondary numerical data in order to observe events, which will be analysed in a numerical and statistical manner. Therefore, we will compute the event study methodology. The event day is the announcement day and the event window is 21 days (10 days before the announcement and 10 days after). The population of the study is a sample of all listed companies in the pharmaceutical sector that respond to the specific criteria. During the given period of 11 years, 327 contract awards were announced, within 12 global pharmaceutical companies, listed on NASDAQ.

Table 3. Sample Limitations.

Publicly traded on Nasdaq	Since 2010
Have won a government contract	Since 2010
Value of the contract	More than 100 000 USD

Source: Authors.

Based on the above criteria, we compute an event study methodology. The event window is typically extended to several days. Days following the announcement are added to the event window to record the market reaction. Days before the announcement date can be added to the event window to record market reaction to any information leaks before the official award announcement.

However, due to the likelihood of confounding effects from other market occurrences, accuracy would be decreased when more days are included in the event window (MacKinlay, 1997). According to Chang and Chen's (1989) research, it is recommended that event windows should be extended for several days as the market continues to react to the new information. Therefore, we assume that the most appropriate analysis will be conducted over a 21-event window. Moreover, previous researchers are also implementing 21 days event window to conduct their observation (Karakuş, 2017; Elayan et al., 2004; Ali & Saha, 2021; Lonkani, 2012). We use the following graph for our research:

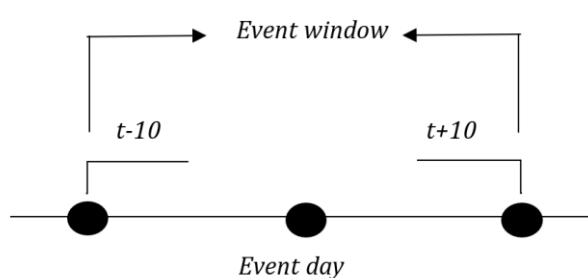


Figure 1. Event window.

Source: Authors.

By incorporating the announcement of government contracts as an event, we can evaluate whether the market's reaction to these announcements is significantly different from what would be expected under normal circumstances.

Therefore, we employed CAPM model, which is a widely accepted financial model that helps assess the expected returns on an investment based on its systematic risk. It provides a framework for understanding the relationship between an asset's expected return, the risk-free rate of return, and the asset's beta, which measures its sensitivity to systematic risk in the overall market (Rossi, 2016). In the context of this study, the CAPM is suitable for analysing the impact of public contract-winning announcements on share prices because it allows us to estimate the expected returns of pharmaceutical companies based on their systematic risk exposure.

The expected return on investment consists of two components: the risk-free rate and the risk premium. The risk-free rate represents the return on an investment with no risk. The risk premium, on the other hand, reflects the additional return that investors demand for bearing the systematic risk associated with an investment. In the case of public contract-winning announcements, these events introduce new systematic risk factors to the pharmaceutical industry. Such announcements can affect the future cash flows and profitability, which in turn affects the overall market risk associated with these investments.

In order to quantify the systematic risk, the CAPM model depicts the beta value. The beta value assesses the amount of sensitivity of the change in stock returns and their relationship to the change in market returns. In this instance, we analyse the variation in the returns of pharmaceutical company stocks and the NASDAQ market. Thus, the first investigations by Jensen, Black & Scholes (1972) and Fama & MacBeth (1973) demonstrated that there is a positive linear connection between beta and the expected return and that portfolios with a greater beta have a higher yield, which is consistent with the model's hypotheses. It represents the sensitivity of the adjustment in

return on security to changes in market return. The formula for beta is (Campbell, 1993):

$$\beta = \frac{Cov(R_j, R_m)}{\sigma_m^2}$$

Where Cov is the covariance of the security, R_j is the rate of return of stock j , R_m is the rate of return on the market. The stock's beta relies on its connection with the market, consequently, represents the market's volatility.

The CAPM model equation describes the link between the expected rate of return on security or portfolio and the estimated market risk. The expected return is the amount of money an investor predicts earning on an investment, based on the investment's previous rate of return or anticipated rates of return under certain situations. The expected return is a metric used to estimate whether the average net result of an investment is positive or negative. Expected rate of return $E(R)$ equals the risk-free rate of return (R_f) increased by a risk premium (RP) which is expressed by the equation (Džaja, 2013; Kisman, 2015):

$$E(R) = R_f + RP$$

Or

$$E(R) = R_f + (R_m - R_f)\beta$$

The above equation represents the regression analysis, used in CAPM. It illustrates the linear relationship between the required rate of return on the stock and the systematic risk (β). The slope ($R_m - R_f$) represents the market risk premium. Stocks having a greater beta are riskier due to the higher risk premium and return rate (Džaja, 2013; Kisman, 2015).

Using the CAPM model, we can calculate the actual return and abnormal returns:

Actual return is the actual profit or loss experienced by an investor on an investment. The difference between the actual return on investment and the expected return on investment gives an analytical framework for determining how an investment performed or why it performed differently than anticipated. Actual returns are evaluated via the approach of continuous computing (Fama, 1976):

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

Where R_{it} represents the actual return, P_t is the adjusted closing price and P_{t-1} indicates the adjusted closing price of the previous day.

A portfolio's abnormal returns are its abnormally large gains or losses over a specific time. The occurrence of unusual returns, which may be positive or negative, assists investors in calculating risk-adjusted performance. In evaluating a security or portfolio's risk-adjusted performance relative to the entire market, abnormal returns are significant measure. In addition, it will demonstrate if investors were adequately compensated for the level of investment risk they accepted. The daily abnormal return is calculated by using the CAPM model (Diltz, 1990):

$$AR_{it} = R_{it} - \{a + R_{ft} + \beta * (R_{mt} - R_{ft})\}$$

Average aggregate abnormal return (AAR) on day t is the mean value of summed abnormal returns of sample firms ($N = 327$) (Diltz, 1990):

$$AAR_t = \frac{1}{N} \sum_{i=1}^N AR_{it}$$

Cumulative abnormal return (CAR) is the total of all abnormal returns. Usually, the calculation of cumulative

abnormal return happens over the event window. The daily abnormal returns are summed over the event window to derive the cumulative abnormal returns (CARs) (Diltz, 1990):

$$CAAR_t = \sum_{t-k}^t AAR_t$$

Where CAAR_t is the cumulative average abnormal return for a company, k is the number of event days before day t, and AAR_t is the average abnormal return.

4. Research Findings

This chapter covers the empirical outcomes of the study. Using the event study methodology, the research assessed the market's response to the contract-winning announcements using abnormal and cumulative abnormal returns. Consequently, stock prices change before and after the announcement will be analysed. The occurrence will have an influence on stock prices if there is a strong positive abnormal return. This section aims to provide a comprehensive overview of the findings and insights derived from the collected data. By analysing the relevant variables and applying statistical techniques, we gain valuable insights into the dataset's relationships, patterns, and trends.

4.1. Cronbach's alpha

In this study, Cronbach's alpha was employed to evaluate the consistency and reliability of the AR and CAR variables. By calculating these coefficients, we can assess the extent to which the items within each scale (AR and CAR) correlate with each other, indicating the degree of internal consistency. A higher Cronbach's alpha suggests that the items within the scale are more strongly correlated and therefore provide a more reliable measure of the construct they represent.

Table 4. Cronbach's alpha.

Cronbach's alpha AR	Standardised Cronbach's Alpha	Cronbach's alpha CAR	Standardised Cronbach's Alpha
0,978	0,980	0,978	0,980

Source: Authors' processing using XLSTAT.

Table 4 indicates Cronbach's alpha of abnormal return (AR) and cumulative abnormal return (CAR) for the whole sample of 327 event days within the 21 days event window in order to get reliable findings. Cronbach's alpha evaluates the consistency's strength. The usual range of Cronbach's alpha reliability coefficient is between 0 and 1. The closer Cronbach's alpha is to 1.0, the higher the internal consistency of the scale's components (Daud, Khidzir, Ismail & Abdullah, 2018).

A Cronbach's alpha of 0.978 indicates a strong correlation between the variables within each scale (CAR and AR), implying that the variables are reliable measures of the constructs they represent. The standardized Cronbach's alpha coefficients for both AR and CAR are 0.980, further supporting the high internal consistency and reliability of the variables. Standardised Cronbach's alpha adjusts for homogeneity within the scales and ensures that the reliability estimates are not disproportionately influenced by scale length or the intercorrelations among the items.

The reliability of the AR and CAR variables is crucial for the validity of the study's findings. By establishing the internal consistency of these variables, we can have confidence that they accurately represent the underlying constructs of abnormal returns and cumulative abnormal returns. This reliability enhances the robustness of the

research outcomes and strengthens the validity of the conclusions drawn from the analysis. It provides confidence that the observed effects on share prices following public contract-winning announcements are more likely to be attributable to the impact of these announcements rather than measurement errors or inconsistencies in the variables.

These findings indicate that the CAR and AR variables used in the study are highly interrelated, suggesting that they capture the underlying constructs accurately and reliably. Such high dependability enhances the validity of the research findings and gives assurance regarding the internal consistency of the measurements. This highlights the coherence and reliability of both measures in assessing abnormal returns and cumulative abnormal returns. The results lend credibility to the overall research outcomes and contribute to a more comprehensive understanding of the true impact of public contract-winning announcements on share prices in the pharmaceutical industry.

4.2. Beta Values

Since the Capital Asset Pricing Model (CAPM) is being used for the study, we must first calculate the beta index. The beta (β) of an investment asset (stock price) measures the volatility of its returns compared to the market as a whole. It is utilised as a risk metric and is a fundamental component of the CAPM. A company with a higher beta has a bigger risk profile, as well as higher projected returns. Betas below 1 minimise market risk. The volatility is lower than the market. Even when the market is moving, the price will rise and fall more slowly when the beta is low. The NASDAQ index is believed to have a beta of 1. A beta smaller than 1 is less risky than the market as a whole, and returns will likely be lower than market returns.

Table 5. Beta index.

Beta	AZN 0,417	BAX 0,029	BAYRY 0,618	GILD 0,679	GLAXF 0,074	JNJ 0,483
Beta	NVS 0,543	PFE 0,552	RHHVF 0,148	SNY 0,687	TAK 0,408	TEVA 0,79

Source: Authors' processing using XLSTAT.

All of the companies in our sample have positive betas below 1, indicating that our sample is not riskier and has a healthy range of 0.02 to 0.79 (Table 5). However, this may influence the judgments of investors who perceive these corporations as a promising investment prospect. In addition, the table provides us with more information in terms of the profitability of the security portfolio of each company. With confidence, we can conclude that our sample of companies has lower risk than the NASDAQ market and provide a level of stability for investors. However, this will result in fewer gains for the investors because the individual stocks will move slower than the market (Black, Jensen, & Scholes, 1972).

Although, it is important to note that a lower beta does not necessarily indicate a lack of profitability. Instead, it suggests that the individual stocks of these companies are less responsive to market fluctuations. This lower risk profile can be attractive to certain investors, especially those who prioritise stability in the long term and are willing to accept potentially lower returns in exchange for reduced volatility.

The results imply that the share prices of these companies are expected to be less responsive to general market movements. As a result, the impact of public contract-winning announcements on the share prices may be more pronounced and significant. When positive news, such as the award, is announced, the market may view these companies as relatively stable and attractive investment prospects. The lower beta values suggest that investors perceive these companies as having a healthier risk profile, which may positively influence their judgments and investment decisions. The perceived stability and reduced risk associated with these companies may lead to increased buying activity and subsequent upward pressure on share prices following the announcement of a public

contract win.

The reduced level of risk associated with these companies, as indicated by their beta values, may contribute to the positive market reaction and higher share prices following the disclosure of government contract wins.

In summary, the lower beta values of the companies in our sample, indicating reduced volatility and lower risk compared to the market, can strengthen our research findings on the impact of public contract-winning announcements on share prices in the pharmaceutical industry. These lower beta values suggest that such announcements may have a more significant and enduring effect on share prices, supported by the perception of these companies as relatively stable and attractive investment prospects.

4.3. Descriptive statistics

The analysis of the descriptive statistics reveals interesting findings regarding the observed variables across different event days (Appendix A). The dataset consists of 327 observations for each event day, providing a substantial sample size for analysis. The minimum and maximum values of the observed variables vary across the event days. For example, on event day t-10, the minimum value recorded was -0.072, while the maximum value was 0.115. Similarly, on event day t+10, the minimum and maximum values were -0.423 and 0.089, respectively. These results demonstrate the range of fluctuations in the observed variables throughout the event days.

The median values of the observed variables tend to remain around zero, indicating a balanced distribution of positive and negative values. This suggests that, on average, the observed variables do not exhibit a significant bias towards positive or negative changes. The mean values of the observed variables are close to zero, indicating that, on average, there is no significant upward or downward trend across the event days. This suggests that the overall mean of the observed variables remains relatively stable over time.

The variance and standard deviation (computed with n-1 denominator) of the observed variables provide insights into the dispersion or variability of the data. The variance is consistently close to zero, indicating a relatively low spread of the observed variables around the mean. The standard deviation ranges from 0.012 to 0.027, indicating relatively low to moderate variability across the event days.

The skewness values (Pearson) range from -11.212 to 1.422, indicating varying degrees of asymmetry in the distribution of the observed variables. Positive skewness values suggest a longer tail on the positive side, while negative skewness values indicate a longer tail on the negative side. The highest skewness value is observed on event day t-10, indicating a significant positive skewness. Conversely, the kurtosis values (Pearson) exhibit a range of 2.596 to 172.074, signifying varying levels of peaks or flatness in the observed variables' distribution. Greater values of kurtosis indicate distributions that have more peaks and heavier tails. The event day t+10 exhibits the maximum kurtosis value, indicating a distribution with significant peaks and heavy tails.

In conclusion, the analysis of descriptive statistics provides insights into the distribution, variability, and shape of the observed variables across the event days. The findings suggest that the observed variables exhibit different levels of skewness and kurtosis, indicating deviations from normality in their distributions.

4.4. AAR and CAAR

Table 6. AAR.

	t (Observed value)	t (Critical value)	DF	p-value (Two-tailed)	alpha
AAR	0,411	2,086	20	0,685	0,05

Source: Authors' processing using XLSTAT.

Table 6 indicates the Average abnormal returns of the whole event window. The t value of the AAR is not significant at a 5% level of significance (a t value of 0.411 is less than the critical value of 2.086) but still positive

(Table 6). As a result, we cannot reject the null hypothesis that the AAR is very close to zero. Thus, we conclude that the market does not give enough opportunities to earn abnormal returns by trading on a daily basis throughout the event window.

Table 7. CAAR.

	t (Observed value)	t (Critical value)	DF	p-value (Two-tailed)	alpha
CAAR	16,192	2,086	20	< 0,0001	0,05

Source: Authors' processing using XLSTAT.

Table 7 demonstrates the CAAR from day t-10 to day t+10 for the whole sample. The t value is statistically significant at a 5 % level of significance. We thus reject the null hypothesis that CAAR is equal to zero. Since the CAAR for this timeframe is positive, the company will accumulate profit during the event window (Table 8). In addition, the market may give opportunities to earn an abnormal return when the company is awarded. The announcement of a government contract signals to the capital market that the firm may offer a good investment opportunity. An optimistic prognosis for future cash flows is instantly reflected in stock price movements. (Lonkani et al., 2012).

The findings indicate that the public announcement of contract winning has a noteworthy influence on the cumulative abnormal returns of pharmaceutical companies. The statistical analysis of the mean CAAR provides additional evidence to support the aforementioned conclusion, as the confidence interval excludes the value of zero. Thus, drawing from these findings, it can be concluded that the public announcements of contract awards have a statistically noteworthy impact on the share prices of the pharmaceutical companies in the examined population, as demonstrated by the significant cumulative abnormal returns (CAAR).

The analysis of the dataset reveals interesting findings regarding the Average Abnormal Returns (AAR), Cumulative Average Abnormal Returns (CAAR), Standard Deviation of Abnormal Returns, and t-values for all companies across different event days.

The AAR values range from -0.00114 to 0.00151, indicating both positive and negative abnormal returns. The t-values associated with the AAR suggest that some of these abnormal returns are statistically significant. Notably, the AAR on event day t-10 is 0.00151 with a t-value of 1.63103, indicating a positive abnormal return and indicates a statistically significant deviation from zero. This suggests that the abnormal returns observed on that day are unlikely to have occurred randomly, indicating a meaningful market response. However, as we progress closer to the event day (t-0), the mean abnormal return becomes negative (-0.00114) and exhibits a larger magnitude compared to earlier event days. The t-value of -1.41844 suggests a statistically significant deviation from zero, indicating a potentially adverse effect on share prices following the contract-winning announcement. In the table, we can observe some t-values close to zero, indicating that the market response to the contract announcements on those event days is not statistically significant.

The variability of the standard deviation of average abnormal returns fluctuates depending on the specific event day being analysed. A higher standard deviation indicates greater market uncertainty and potential opportunities for investors to exploit deviations from expected returns. Conversely, a lower standard deviation indicates more stable market reactions and less potential for abnormal profits. On the event day t-10, the standard deviation of abnormal returns is 0.01675 and on event day t+10 is the highest at 0.02739. This suggests a relatively higher variability in market reactions, indicating that some pharmaceutical companies experienced larger deviations from the expected returns compared to others on that particular event day.

The cumulative abnormal returns (CAAR) provide a measure of the aggregated impact of public contract announcements on share prices over the event window. Similar to the AAR, the CAAR also exhibits fluctuations across the event days. The CAAR values range from 0.00068 to 0.00269, indicating a gradual accumulation of

positive abnormal returns over the event days. However, the magnitudes of the CAAR values are relatively small. For instance, on the event day t-10, the CAAR for all companies is 0.00155, with a standard deviation of 0.01674 and a t-value of 1.67664. This indicates a positive cumulative impact on share prices following the contract announcement.

Table 8. Standard deviation and t value of AAR and CAAR.

Event Days	AAR of all companies	Standard Deviation AR	t value	Event Days	CAAR for all	Standard Deviation CAR	t value
t-10	0,00151	0,01675	1,63103	t-10	0,00155	0,01674	1,67664
t-9	0,00044	0,01460	0,54523	t-9	0,00199	0,02192	1,64343
t-8	0,00070	0,01496	0,84199	t-8	0,00269	0,02662	1,82672
t-7	-0,00027	0,01286	-0,37981	t-7	0,00242	0,02876	1,52094
t-6	-0,00046	0,01268	-0,65055	t-6	0,00196	0,03098	1,14577
t-5	-0,00043	0,01714	-0,45054	t-5	0,00154	0,03371	0,82391
t-4	-0,00046	0,01476	-0,56711	t-4	0,00107	0,03867	0,50168
t-3	0,00028	0,01435	0,34882	t-3	0,00135	0,04234	0,57641
t-2	0,00045	0,01276	0,64464	t-2	0,00180	0,04454	0,73261
t-1	0,00002	0,01562	0,01973	t-1	0,00182	0,04693	0,70189
t-0	-0,00114	0,01454	-1,41844	t-0	0,00068	0,04997	0,24654
t+1	0,00076	0,01502	0,91120	t+1	0,00144	0,05348	0,48628
t+2	0,00011	0,01418	0,14063	t+2	0,00155	0,05493	0,50975
t+3	-0,00006	0,01465	-0,07021	t+3	0,00149	0,05872	0,45932
t+4	0,00071	0,01411	0,91311	t+4	0,00220	0,05803	0,68687
t+5	-0,00016	0,01189	-0,23861	t+5	0,00205	0,05821	0,63602
t+6	-0,00007	0,01304	-0,10005	t+6	0,00198	0,06050	0,59036
t+7	-0,00096	0,01363	-1,27862	t+7	0,00101	0,06145	0,29767
t+8	0,00043	0,01255	0,61559	t+8	0,00144	0,06276	0,41455
t+9	0,00030	0,01428	0,38352	t+9	0,00174	0,06692	0,47061
t+10	-0,00053	0,02739	-0,34711	t+10	0,00139	0,07218	0,34732

Source: Authors' processing using XLSTAT.

However, as we approach the event day (t-0), the CAAR decreases, suggesting a decline in share prices. The t-value of 0.24654 indicates that the cumulative abnormal returns are not statistically significant. Furthermore, the majority of the t-values for the CAAR and standard deviation are relatively small and indicate limited statistical significance.

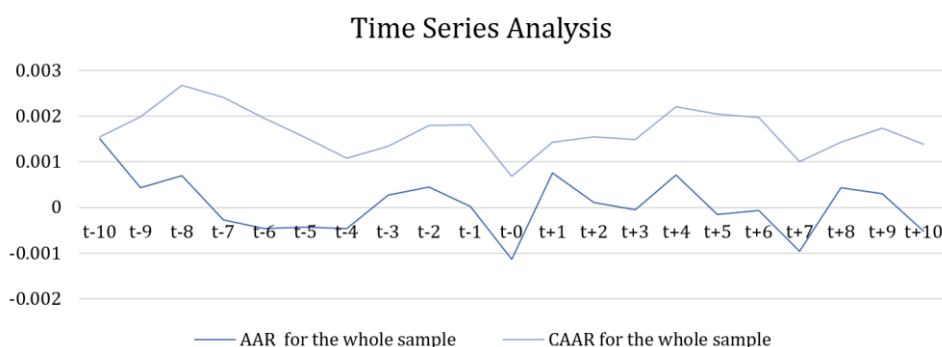


Figure 2. Time Series Analysis.

Source: Authors' processing using XLSTAT.

The AAR values represent the abnormal returns of each company on specific event days. On event day t-10, the AAR is 0.0015, indicating a positive abnormal return for all companies (Table 8). Similarly, on event day t-9, t-8, and

t-7, the AAR values are also positive but relatively smaller in magnitude. On event days t-6 to t+10, the AAR values fluctuate between positive and negative, indicating varying abnormal returns across different companies.

On the other hand, the CAAR values represent the cumulative abnormal returns for all companies from event day t-10 to t+10. The CAAR starts with a positive value of 0.0016 on event day t-10 and gradually increases over time. This suggests that, on average, the cumulative abnormal returns for all companies experience a positive trend from t-10 to t+10. The CAAR reaches its highest value in the post-event window of 0.0027 on event day t+4, indicating a relatively stronger positive cumulative abnormal return during that period.

The findings indicate that, on average, there is a tendency for positive abnormal returns and cumulative abnormal returns for all companies across the event days. However, it is important to note that the magnitudes of the abnormal returns and cumulative abnormal returns vary across different event days, suggesting fluctuations and potential differences in performance among the companies.

The analysis of average abnormal returns and cumulative average abnormal returns provides valuable insights into the impact of public contract-winning announcements on the share prices of pharmaceutical companies in the NASDAQ stock exchange. Based on the results, it is evident that the announcement of winning a US federal contract by pharmaceutical companies initially generates positive abnormal returns, indicating a positive market response. This suggests that investors perceive the contract award as a positive investment opportunity, leading to an increase in share prices in the days immediately following the announcement (Figure 2).

However, as the event day approaches, the abnormal returns start to decline and even turn negative on the event day (t-0). This suggests that the initial positive market response may not be sustained in the long run. The declining trend in cumulative abnormal returns also indicates a diminishing impact of the contract announcement on share prices over the event window.

These findings imply that while winning a public contract from the US government can create a short-term positive impact on share prices for pharmaceutical companies, the significance and sustainability of this impact may vary. The market response appears to diminish as the event day approaches, potentially reflecting a revaluation of the contract's long-term implications by investors. However, there are stable positive cumulative abnormal returns, observed after the event day from t+1 up to t+6, which indicates the possibility of stable profits from the investment. We can conclude that the market absorbs the information for a short time period. It appears that the investors can earn profits during the event window.

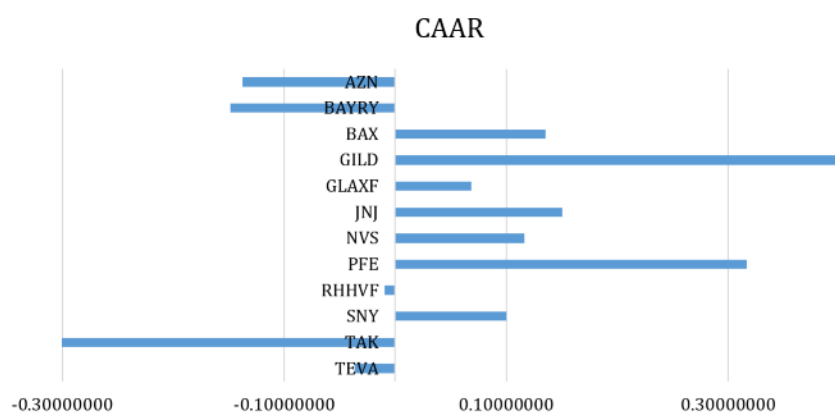


Figure 3. CAAR for each company.

Source: Authors' processing using XLSTAT.

Figure 3 presents CAAR from t -10 to t+10 for each company used in the sample. We conclude that all of the pharmaceutical companies have different CAARs, even if all of them are big drug companies and have an award from

the US government. Among the companies listed, GILD has the highest cumulative abnormal return of 0.41413296, indicating a positive trend in abnormal returns during the event period (Appendix B). This suggests that GILD's stock performance exceeded what would be expected based on the market's overall behaviour.

On the other hand, TAK has the lowest cumulative abnormal return of -0.32117618, indicating a significant negative trend in abnormal returns during the event period. This suggests that TAK's stock performance underperformed compared to the market's overall behaviour.

Other companies such as PFE, JNJ, NVS, and BAX also show positive cumulative abnormal returns, suggesting relatively better stock performance compared to the market. Conversely, companies like TEVA, RHHVF, BAYRY, and AZN exhibit negative cumulative abnormal returns, indicating poorer stock performance compared to the market.

4.5. ANOVA

The ANOVA (Analysis of Variance) analysis is a suitable statistical method for examining the impact of public contract-winning announcements on share prices in the pharmaceutical industry. Since it allows us to build a comparison of multiple groups, making it applicable to our study where we are examining the variations in cumulative abnormal returns (CAR) across different pharmaceutical companies. By analysing these variations, we can identify significant differences between subjects and understand how public contract awards affect share prices differently among companies.

Furthermore, ANOVA enables us to partition the total variance in CAR into different components. This allows us to identify the sources of variability, such as subject-specific factors, between-measures differences, and residual variance. By understanding the relative contributions of these factors, we can gain insights into whether the variations in CAR are primarily driven by company-specific characteristics, market reputation, or other sources.

It also provides a statistical framework for hypothesis testing, allowing us to determine the significance of the observed differences in CAR between subjects and between measures. This helps us make valid inferences about the impact on share prices. By calculating the F-value and associated p-value, we can assess whether the observed differences are statistically significant and not due to chance.

Additionally, ANOVA enables us to evaluate the reliability of our measures. By examining the within-subjects variance, we can assess whether the specific measures used, such as time intervals or announcement events, significantly influence the observed abnormal returns. This ensures that our measurements are consistent and reliable in capturing the effects of public contract-winning announcements on share prices.

Moreover, the analysis is robust and applicable to various sample sizes and data distributions. It provides a solid statistical analysis that can handle a larger sample of observations, increasing the generalisability of our findings. By employing ANOVA, we can draw robust conclusions about the impact of public contract award on share prices in the pharmaceutical industry, enhancing the credibility and validity of our research.

Table 9. Analysis of variances.

Source	DF	Sum of squares	Mean squares	F	Pr > F
Between subjects	326	11,671	0,036	45,588	< 0,0001
Within subjects	6540	5,122	0,001		
Between measures	20	0,001	0,000	0,094	1,000
Residual	6520	5,120	0,001		
Total	6866	16,793	0,002		

Source: Authors' processing using XLSTAT.

The ANOVA results indicate that there is a significant difference in the CAR between subjects, as evidenced by a large F-value of 45.588 ($p < 0.0001$). This suggests that the CAR values vary significantly across the different subjects. The between-subjects factor accounts for a substantial proportion of the variance in the CAR. This implies

that factors specific to each subject contribute to the variations observed in the abnormal returns. It suggests that the impact of public contract-winning announcements on share prices varies among different subjects, potentially due to varying levels of market reputation, financial performance, or competitive advantages.

Furthermore, the within-subjects analysis shows that there is no significant difference in the CAR between measures ($F = 0.094$, $p = 1.000$). This implies that the CAR values within each subject and measure are similar and do not differ significantly. This indicates that the measures used to assess the CAR, such as time intervals or specific market events, do not significantly affect the observed abnormal returns.

The total sum of squares indicates the overall variability in the CAR, with a total sum of squares of 16.793. The partitioning of the sum of squares between subjects, between measures, and residual components allows for a comprehensive understanding of the sources of variance in the CAR, indicating that subject-specific factors play a significant role in explaining the variations in abnormal returns.

Overall, the ANOVA analysis strengthens our research findings by highlighting the significant differences in CAR between subjects and demonstrating the reliability of the chosen measures. It underscores the importance of subject-specific factors in understanding the variations in abnormal returns and provides valuable insights into the sources of variability in the CAR. This enhances the validity and robustness of our research findings and contributes to a more comprehensive understanding of the impact of public contract-winning announcements on share prices in the pharmaceutical industry.

4.6. Discussion of the findings

The discussion of our findings provides valuable insights into the relationships between the variables in our study and their relevance to the research question and hypotheses. By examining the implications of our results, we can gain a deeper understanding of the impact of public contract-winning announcements on share prices in the pharmaceutical industry and assess the alignment with our initial hypotheses.

The results of Cronbach's alpha analysis indicate a high level of internal consistency and reliability of the abnormal return (AR) and cumulative abnormal return (CAR) variables. With Cronbach's alpha coefficients of 0.978 and standardised Cronbach's alpha coefficients of 0.980, it can be concluded that the variables under consideration have high internal consistency and are reliable measures of the underlying constructs. This enhances the validity of our research findings and underscores the coherence and reliability of both measures in assessing abnormal returns and cumulative abnormal returns. The outcome of this analysis offers assurance that the perceived fluctuations in stock prices following the revealing of public contract-winning announcements are likely driven by the influence of these announcements, rather than inaccuracies in measurement or inconsistencies in the variables.

Secondly, the beta values calculated for the companies in our sample indicate that they have positive betas below 1. This suggests that our sample of companies is not riskier than the market as a whole, and their volatility is lower than that of the market. While this may result in slower price movements compared to the market, it also implies a lower level of risk for investors. Therefore, our findings suggest that these companies offer a relatively stable investment opportunity with lower risk.

The descriptive statistics of the abnormal return variables provide insights into their distribution and variability across different event days. The data show a range of fluctuations, with both positive and negative values observed. The mean values remain close to zero, indicating no significant upward or downward trend on average. The variance and standard deviation are relatively low, suggesting moderate variability in the observed variables. Additionally, the skewness and kurtosis values indicate deviations from normality in their distributions, with varying degrees of asymmetry.

The t-value and p-value analysis of the average abnormal return (AAR) and cumulative abnormal return (CAAR) demonstrate significant outcomes. The AAR is not statistically significant, suggesting that the market does not

provide sufficient opportunities to earn abnormal returns by daily trading throughout the event window. However, the CAAR is statistically significant, indicating that the public contract-winning announcements have a significant impact on the cumulative abnormal returns of the pharmaceutical companies in our sample. This suggests that the market reacts positively to such announcements, and investors can accumulate profit during the event window.

Lastly, the ANOVA analysis reveals a significant difference in the CAR between subjects, indicating that the subjects exhibit varying levels of abnormal returns. However, there is no significant difference in the CAR between measures, suggesting that the CAR values within each subject and measure are relatively consistent. These findings contribute to our understanding of the factors influencing abnormal returns in the studied sample.

In conclusion, our findings highlight the reliability of the AR and CAR variables, the lower risk profile of the companies in our sample, the distribution and variability of abnormal returns across event days, and the significant impact of public contract-winning announcements on cumulative abnormal returns. These findings contribute to a deeper understanding of the relationship between event announcements and market performance in the pharmaceutical sector, providing valuable insights for investors and stakeholders.

The findings demonstrate that winning a public contract has a positive impact on share prices immediately after the announcement. This suggests that investors perceive the award as a positive investment opportunity, resulting in potential profit around the event day. However, the statistical significance of the abnormal returns and cumulative abnormal returns is found to be insignificant. This finding suggests that the initial impact of these announcements on share prices is relatively immediate but may not be sustained over a longer term. It suggests that the market quickly incorporates the information conveyed by these announcements, adjusting prices accordingly.

Considering the impact on share prices, this finding implies that investors who act promptly upon the release of contract-winning announcements may have the opportunity to capitalise on the short-term price movements. It suggests that there may be a time window during which investors can take advantage of the market's initial reaction to these announcements. However, it also highlights the importance of swift decision-making and efficient market timing, as the market's absorption of the information is in a prompt manner.

The finding aligns with the hypothesis that contract-winning announcements have an immediate impact on share prices. The observed short-term price adjustments validate the notion that these announcements trigger market reactions, leading to temporary deviations from the pre-announcement price levels. This supports the hypothesis that contract-winning announcements carry informational content that affects share prices in the pharmaceutical industry.

However, it is worth noting that the finding of short-term absorption does not necessarily contradict the hypothesis of a sustained impact of contract-winning announcements. While the initial price adjustment may be short-term, it is possible that the announcements still have longer-term effects on market participants' perceptions of the company's prospects, business opportunities, and growth potential. Future research could explore the persistence and long-term implications of contract-winning announcements on share prices, thereby providing a more comprehensive understanding of the dynamics involved.

In summary, the finding that the market absorbs the information from contract-winning announcements for a short time period implies that investors have a limited window to take advantage of the initial price adjustments. This finding supports the hypothesis that these announcements impact share prices, albeit temporarily.

The outcomes of the current study are consistent with prior research that has identified significant positive abnormal returns following the announcement of a contract (Choi, 2014; Diltz, 1990; Elayan et al., 2011; Karakus, 2017; Lonkani et al., 2012; Yang et al., 2014). However, it is crucial to acknowledge the industry-specific context of the pharmaceutical sector and the limitations of the research.

Overall, our study contributes to a deeper understanding of the relationship between public contract-winning

announcements and market performance in the pharmaceutical sector. The insights provided are valuable for investors and stakeholders in making informed decisions regarding the potential impact of these announcements on share prices. Future research can build upon these findings by exploring additional factors and extending the analysis to other industries, enhancing the understanding of market reactions to significant events.

5. Conclusion

The objective of the research was to evaluate the disclosure of winning contracts granted by the United States government to pharmaceutical corporations during the specified timeframe from 2010 to 2021. The method employed is the event study methodology and the Capital Asset Pricing Model (CAPM). The effect was evaluated by determining the abnormal returns and cumulative abnormal returns during the event window, which included 10 days before and 10 days after the event day.

The findings demonstrated the high internal consistency and reliability of the AR and CAR variables, indicating their usefulness as reliable measures for assessing abnormal returns. The reliability of these measures suggests that the fluctuations in stock prices following contract-winning announcements are likely driven by the influence of these events. The lower risk profile of the pharmaceutical companies suggested a relatively stable investment opportunity. The significant impact of public contract-winning announcements on cumulative abnormal returns emphasised the importance of these events in influencing market performance.

Furthermore, the analysis of average abnormal return (AAR) and cumulative abnormal return (CAAR) demonstrates significant outcomes. It is observed positive but insignificant AAR within the event window, which fluctuates before the event day. Although, after the announcement, the CAAR is statistically significant and positively stable up to day $t+6$, as observing a significant increase on day $t+1$. It appears that the investors can earn profits during the event window. However, there are positive but not significant CAAR and AAR after the day of the disclosure, defining that the announcement of winning a government contract has a lower impact on the stock market.

The finding that there is a significant difference in the cumulative abnormal returns (CAR) between subjects suggests varying levels of abnormal returns among the companies in our sample. However, there is no significant difference in CAR between measures, indicating relative consistency in CAR values within each subject and measure.

Overall, our findings contribute to a deeper understanding of the relationship between event announcements and market performance in the pharmaceutical sector. The robustness of the AR and CAR variables, the lower risk profile of the companies in our sample, the distribution and variability of abnormal returns across event days, and the significant impact of public contract-winning announcements on cumulative abnormal returns provide valuable insights for investors and stakeholders.

These findings imply that winning a public contract has a positive but short-term impact on share prices. Investors can potentially capitalise on the market's initial reaction to these announcements within a limited window of time. Swift decision-making and efficient market timing are crucial in taking advantage of the market's absorption of the information.

The finding supports the hypothesis that contract-winning announcements have an immediate impact on share prices, validating the notion that these events carry informational content that affects market reactions. However, the short-term absorption of the information does not necessarily contradict the hypothesis of a sustained impact.

5.1. Implications

The results of the study carry significant implications for investors, market players, and interested parties within the pharmaceutical sector. The robust internal consistency and reliability of the AR and CAR variables

provide evidence for their effectiveness as dependable metrics. This enhances comprehension of market dynamics and enables rational investment decision-making.

Secondly, the lower risk profile of the pharmaceutical companies in the sample indicates a relatively stable investment opportunity for investors. This information can guide investment strategies and portfolio management decisions, helping investors to balance risk and potential returns. This finding is particularly relevant for risk-averse investors who seek to minimise their exposure to market volatility. The lower risk profile suggests that investing in pharmaceutical companies can provide a more predictable and steady return on investment compared to the broader market.

Moreover, the significant impact of public contract-winning announcements on cumulative abnormal returns highlights the importance of such events in shaping market performance in the pharmaceutical sector. This insight can assist market participants and stakeholders in anticipating market reactions and identifying potential investment opportunities surrounding such announcements. Investors can leverage this information to capitalise on the positive market reactions following such announcements. Additionally, stakeholders within the pharmaceutical sector, such as executives and policymakers, can recognise the influence of contract-winning announcements on market performance and use this knowledge to inform their decision-making processes.

In terms of the contribution to the existing body of research, this study adds to the literature by focusing specifically on the pharmaceutical sector and analysing the impact of contract-winning announcements on market performance. While prior research has explored the relationship between event announcements and abnormal returns in various industries, the pharmaceutical sector has unique characteristics and dynamics that warrant separate investigation. Therefore, our findings contribute to a more nuanced understanding of the market dynamics within this sector and provide valuable insights for future research endeavours.

Overall, the findings of this study have implications for investors seeking to make informed investment decisions, stakeholders within the pharmaceutical sector, and researchers investigating the relationship between event announcements and market performance. By evaluating the findings and discussing their implications in detail, this study provides valuable insights that can guide investment strategies, inform decision-making processes, and advance our understanding of the pharmaceutical market.

5.2. Limitations

It is important to acknowledge the limitations of this study. Firstly, the analysis focused only on a specific industry (pharmaceutical) and a limited number of companies traded on the NASDAQ market. Generalising the findings to other industries or markets requires caution.

Secondly, the event study methodology employed in this research relies on the assumption of market efficiency. Other factors beyond the scope of this study, such as external market conditions or regulatory changes, could also influence market performance and abnormal returns.

Additionally, the research period covered 2010 to 2021, and future studies could explore longer time frames to capture additional market dynamics and potential shifts in industry trends. Furthermore, the study did not consider other factors, such as firm-specific characteristics, macroeconomic variables, or competitive landscape, which could influence share prices and abnormal returns. Future research could incorporate these factors to provide a more comprehensive analysis.

Funding Statement

This research received no external funding.

Acknowledgment

Acknowledgments to anonymous referees' comments and editor's effort.

Author Contributions

Conceptualisation: Anita Yordanova and Eyden Samunderu; Investigation: Anita Yordanova; Methodology: Anita Yordanova and Eyden Samunderu; Formal analysis: Anita Yordanova and Eyden Samunderu; Writing – original draft: Anita Yordanova; Writing – review & editing: Anita Yordanova & Eyden Samunderu.

Declaration of Competing Interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

Appendix

A1. Descriptive Statistics of Abnormal Return.

	N	Minimum	Maximum	Median	Mean	Variance (n-1)	Standard deviation (n-1)	Skewness (Pearson)	Kurtosis (Pearson)
t-10	327	-0,072	0,115	0	0,002	0	0,017	1,407	10,592
t-9	327	-0,048	0,063	0	0	0	0,015	0,203	1,911
t-8	327	-0,053	0,107	0	0,001	0	0,015	1,378	10,727
t-7	327	-0,094	0,049	-0,001	0	0	0,013	-0,717	8,974
t-6	327	-0,057	0,052	-0,001	0	0	0,013	-0,009	2,974
t-5	327	-0,095	0,093	-0,001	0	0	0,017	0,372	7,374
t-4	327	-0,079	0,062	0	0	0	0,015	-0,575	6,73
t-3	327	-0,065	0,066	0	0	0	0,014	0,564	4,186
t-2	327	-0,051	0,065	0,001	0	0	0,013	0,073	3,266
t-1	327	-0,101	0,094	-0,001	0	0	0,016	-0,247	10,639
t-0	327	-0,12	0,054	-0,001	-0,001	0	0,015	-1,693	14,708
t+1	327	-0,051	0,094	0	0,001	0	0,015	1,422	8,303
t+2	327	-0,069	0,069	-0,001	0	0	0,014	0,604	4,969
t+3	327	-0,051	0,085	-0,001	0	0	0,015	0,727	4,868
t+4	327	-0,063	0,114	0,001	0,001	0	0,014	1,314	13,784
t+5	327	-0,04	0,052	0	0	0	0,012	0,754	3,798
t+6	327	-0,046	0,073	0	0	0	0,013	0,489	3,382
t+7	327	-0,049	0,086	-0,001	-0,001	0	0,014	0,623	5,33
t+8	327	-0,042	0,06	0	0	0	0,013	0,61	2,596
t+9	327	-0,069	0,089	0	0	0	0,014	-0,133	7,268
t+10	327	-0,423	0,07	0	-0,001	0,001	0,027	-11,212	172,074

Source: Authors' processing using XLSTAT.

A2. CAAR for each company.

Name	TEVA	TAK	SNY	RHHVF	PFE	NVS
CAAR	-0,03679323	-0,32117618	0,10031831	-0,00938474	0,31648489	0,11639812
Name	JNJ	GLAXF	GILD	BAX	BAYRY	AZN
CAAR	0,15047899	0,06857647	0,41413296	0,13535718	-0,14839782	-0,13776935

Source: Authors' processing using XLSTAT.

References

- Abdurakhmonov, M., Ridge, J. W., & Hill, A. D. (2021). Unpacking firm external dependence: How government contract dependence affects firm investments & market performance. *Academy of Management Journal*, 64(1), 327-350. <https://doi.org/10.5465/amj.2018.0067>
- Afego, P. N. (2013). Stock price response to earnings announcements: Evidence from the Nigerian stock market. *Journal of African Business*, 14(3), 141-149. <https://doi.org/10.1080/15228916.2013.844008>
- Agrawal, M., Kishore, R., & Rao, H. R. (2006). Market reactions to e-business outsourcing announcements: An event study. *Information & Management*, 43(7), 861-873. <https://doi.org/10.1016/j.im.2006.08.002>
- Ali, N. P., & Saha, A. (2021). Market Efficiency of Indian Capital Market: An Event Study around the Announcement of Results of Lok Sabha Election 2019. *International Journal of Financial Research*, 12(1), 60-70. <https://doi.org/10.5430/ijfr.v12n1p>
- Asamoah, G. N., & Nkrumah, K. (2010). The impact of dividend announcement on share price behaviour in Ghana. *Journal of Business & Economics Research*, 8(4), 47-58. <https://doi.org/10.19030/jber.v8i4.702>
- Burton, B. M., Lonie, A. A., & Power, D. M. (2000). The impact of corporate growth opportunities on the market response to new equity announcements. *Applied Financial Economics*, 10(1), 27-36. <https://doi.org/10.1080/096031000331897>
- Campbell, J.Y., & Jianping Mei. (1993). "Where do betas come from? Asset price dynamics & the sources of systematic risk." *The Review of Financial Studies*, 6(3), 567-592. <https://doi.org/10.1093/rfs/5.3.567>
- Capelle-Blancard, G., & Couderc, N. (2008). What drives the market value of firms in the defense industry? *Review of Financial Economics*, 17(1), 14-32. <https://doi.org/10.1016/j.rfe.2007.02.001>
- Chang, S. J., & Chen, S. N. (1989). A study of call price behavior under a stationary return generating process. *Financial Review*. <https://doi.org/10.1111/j.1540-6288.1989.tb00346.x>
- Choi, J. (2014). Effects of contract announcements on the value of construction firms. *Journal of Management in Engineering*, 30(1), 86-96. [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0000178](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000178)
- Dasilas, A., & Leventis, S. (2011). Stock market reaction to dividend announcements: Evidence from the Greek stock market. *International Review of Economics & Finance*, 20(2), 302-311. <https://doi.org/10.1016/j.iref.2010.06.003>
- Daud, K. A. M., Khidzir, N. Z., Ismail, A. R., & Abdullah, F. A. (2018). Validity & reliability of instrument to measure social media skills among small & medium entrepreneurs at Pengkalan Datu River. *International Journal of Development and Sustainability*, 7(3), 1026-1037.
- Dedunu, H. H. (2018). Impact of dividend announcement on share price: Evidence from Colombo Stock Exchange. *International Journal of Management Sciences and Business Research*, 7(12), 1-7.
- Diltz, J. D. (1990). Valuation effects of government contract awards. *Quarterly Journal of Business and Economics*, 3-15. <https://www.jstor.org/stable/40472995>
- Duppati, G., Abidin, S., & Hu, J. (2015). Do mergers & acquisitions in China create value to acquiring firms? *Corporate Ownership and Control*, 12(4), 117-140. <https://doi.org/10.22495/cocv12i4p9>
- Džaja, J., & Aljinović, Z. (2013). Testing CAPM model on the emerging markets of the Central & South-eastern Europe. *Croatian Operational Research Review*, 4(1), 164-175. <https://hrcak.srce.hr/file/143353>
- Elayan, F. A., Pukthuanthong, K., & Roll, R. (2006). Investor Reaction to Inter-corporate Business Contracting: Evidence & Explanation. *Economic Notes*, 35(3), 253-291. <https://doi.org/10.1111/j.1468-0300.2006.00166.x>
- Elayan, F., Pukthuanthong, K., & Li, J. (2004). The Valuation Effect & Determinants of Corporate Contracting, SSRN Working Paper Series, Rochester: 2004.
- Elayan, F., Pukthuanthong, K., & Li, J. (2011). The Determinants & Impact of Government Contract Award on the Market Value of the Winning Firms.
- Elbannan, M. A. (2015). The capital asset pricing model: an overview of the theory. *International Journal of Economics & Finance*, 7(1), 216-228. <https://doi.org/10.5539/ijef.v7n1p216>
- Fama, E. F. (1970). Efficient capital markets: A review of theory & empirical work. *The Journal of Finance*, 25(2), 383-417. <https://doi.org/10.2307/2325486>
- Fama, E. F., & MacBeth, J. D. (1973). Risk, return, & equilibrium: Empirical tests. *Journal of political economy*, 81(3), 607-636.
- Federal Acquisition Regulation (FAR) (2014). 48 Code of Federal Regulations (CFR) § 5.303.
- Fery, J., Gasbarro, D., Woodliff, D. R., & Zumwalt, J. K. (2003). Market reaction to published & non-published corporate loan announcements. *The Quarterly Review of Economics & Finance*, 43(1), 1-10. [https://doi.org/10.1016/S1062-9769\(02\)00118-7](https://doi.org/10.1016/S1062-9769(02)00118-7)
- Firth, M. (1976). The impact of earnings announcements on the share price behaviour of similar type firms. *The*

- Economic Journal*, 86(342), 296-306. <https://doi.org/10.2307/2230748>
- Gupta, S., Dogra, B., Vashisht, A. K., & Ghai, S. (2012). Stock Price Reaction to Dividend Announcements. *International journal of financial management*, 2(2).
- Gurgul, H., Mestel, R., & Schleicher, C. (2003). Stock market reactions to dividend announcements: Empirical evidence from the Austrian stock market. *Financial Markets & Portfolio Management*, 17(3), 332. <https://doi.org/10.1007/s11408-003-0304-1>
- Hanvanich, S., & Çavuşgil, S. T. (2001). Stock market reactions to international joint venture announcement: An event analysis. *International Business Review*, 10(2), 139-154. [https://doi.org/10.1016/s0969-5931\(00\)00048-2](https://doi.org/10.1016/s0969-5931(00)00048-2)
- Ikäheimo, S., Kjellman, A., Holmberg, J., & Jussila, S. (2004). Employee stock option plans & stock market reaction: evidence from Finland. *The European Journal of Finance*, 10(2), 105-122. <https://doi.org/10.1080/1351847032000137447>
- Jensen, M. C., Black, F., & Scholes, M. S. (1972). The capital asset pricing model: Some empirical tests. <https://ssrn.com/abstract=908569>
- Karakuş, R. (2017). The Effect of Contract Winning Announcement on the Market Value of Firms: An Empirical Research in Borsa Istanbul. *The Journal of International Scientific Researches*, 1-10. <https://doi.org/10.23834/isrjournal.342052>
- Kisman, Z., & Restiyanita, S. (2015). M. The Validity of Capital Asset Pricing Model (CAPM) & Arbitrage Pricing Theory (APT) in Predicting the Return of Stocks in Indonesia Stock Exchange. *American Journal of Economics, Finance and Management*, 1(3), 184- 189.
- Kumar Pradhan, S., & Kasilingam, R. (2016). Impact of buyback announcement on share price: A company & industry wise analysis. *International Journal of Management & Business Research*, 6(1), 13-21.
- Langmann, C. (2007). Stock market reaction & stock option plans: Evidence from Germany. *Schmalenbach Business Review*, 59, 85-106. <https://doi.org/10.1007/bf03396743>
- Larson, S. J., & Picou, A. (2002). The market's response to contract award announcements: government versus corporate contracts. *Journal of Public Procurement*. <https://doi.org/10.1108/jopp-02-02-2002-b004>
- Lee, P. M. (1997). A comparative analysis of layoff announcements & stock price reactions in the United States & Japan. *Strategic Management Journal*, 18(11), 879-894. [https://doi.org/10.1002/\(sici\)1097-0266\(199712\)18:11<879::aid-smj929>3.0.co;2-v](https://doi.org/10.1002/(sici)1097-0266(199712)18:11<879::aid-smj929>3.0.co;2-v)
- Loewenstein, G. F., Weber, E. U., Hsee, C. K. & Welch, N. (2001), Risks as Feelings, *Psychological Bulletin* 127, 267-286. <https://doi.org/10.1037/0033-2909.127.2.267>
- Lonkani, R., Changchit, C., & Satjawathee, T. (2012). Examining of the Effects of Business Contract Announcements on Stock Prices in Thailand. *International Research Journal of Finance & Economics*, 93, 67-83.
- Ma, J., Pagan, J. A., & Chu, Y. (2009). Abnormal Returns to Mergers and Acquisitions in Ten Asian Stock Markets. *International Journal of business*, 14(3).
- NASDAQ (2012): Nasdaq Listing Standards & Fees May 2010, NASDAQ Website, <https://listingcenter.nasdaq.com/rulebook/nasdaq/rules/Nasdaq%205200%20Series>
- Neuhierl, A., Scherbina, A., & Schlusche, B. (2013). Market reaction to corporate press releases. *Journal of Financial & Quantitative Analysis*, 48(4), 1207-1240. <https://doi.org/10.2139/ssrn.1556532>
- Owusu, F., Gyau, E. K., & Amaning, N. (2016). The effect OF earnings announcement ON share price OF manufacturing companies ON the Ghana stock exchange. *European Journal of Accounting, Auditing & Finance Research*, 4(6), 96-111. ISSN 2054-6327(online)
- Parveen, S., Satti, Z. W., Subhan, Q. A., & Jamil, S. (2020). Exploring market overreaction, investors' sentiments & investment decisions in an emerging stock market. *Borsa Istanbul Review*, 20(3), 224-235. <https://doi.org/10.1016/j.bir.2020.02.002>
- Pettit, R. R., & Westerfield, R. (1974). Using the capital asset pricing model & the market model to predict security returns. *Journal of Financial & Quantitative Analysis*, 9(4), 579-605. <https://doi.org/10.2307/2329762>
- Rosen, R. J. (2006). Merger momentum & investor sentiment: The stock market reaction to merger announcements. *The Journal of Business*, 79(2), 987-1017. <https://doi.org/10.1086/499146>
- Rossi, M. (2016). The capital asset pricing model: a critical literature review. *Global Business and Economics Review*, 18(5), 604-617. <https://doi.org/10.1504/GBER.2016.10000254>
- Shafiq, S., & Qureshi, S. S. (2022). Impact of budget announcement on stock returns: An Event Study in Pharmaceutical & Automobile sector. *GMJACS*, 12(1), 14-14. <https://doi.org/10.59263/gmjacs.12.01.2022.219>
- Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance*, 19(3), 425-442. <https://doi.org/10.1111/j.1540-6261.1964.tb02865.x>
- Song, C., & Han, S. H. (2017). Stock market reaction to corporate crime: Evidence from South Korea. *Journal of Business Ethics*, 143, 323-351. <https://doi.org/10.1007/s10551-015-2717-y>

- Sorescu, A., Warren, N.L. & Ertekin, L. (2017). Event study methodology in the marketing literature: An overview. *Journal of the Academy of Marketing Science* 45, 186–207 DOI:10.1007/s11747-017-0516-y
- Syed, A. M., & Bajwa, I. A. (2018). Earnings announcements, stock price reaction & market efficiency—the case of Saudi Arabia. *International Journal of Islamic & Middle Eastern Finance & Management*. DOI:10.1108/IMEFM-02-2017-0044
- United States. (n.d.). USAspending.gov. Retrieved October 8 2022 from <https://purl.fdlp.gov/GPO/LPS91044>
- Woolridge, J. R., & Snow, C. C. (1990). Stock market reaction to strategic investment decisions. *Strategic management journal*, 11(6), 433-448.
- Yang, J., Lu, W., & Zhou, C. (2014). The immediate impact of purchasing/sales contract announcements on the market value of firms: An empirical study in China. *International Journal of Production Economics*, 156, 169-179. DOI:10.1016/j.ijpe.2014.06.002