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The impact of a company's annual report on the stock return (COVID-19):

An assessment of investor behavior during a crisis

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The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics, or Erasmus University Rotterdam.

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ABSTRACT

This study examines whether the release of a company's annual report during the COVID crisis significantly impacts the stock return to forecast the behavior of investors during a future crisis. The author conjectures that stock returns are statistically significant in a negative direction during the COVID crisis. An event study is performed on a sample of companies from the S&P 500 that consists of Apple, Amazon, American Airlines, and Tesla. The estimation window, which consisted of 120 trading days, was used to compute the Market Model for each company through a regression. Daily stock returns were regressed on daily S&P 500 returns. Arriving at the event window which consists of five days, the impact of the release of the annual reports on the abnormal stock returns was measured. The findings suggest that the release of the annual report affected each company differently. Apple saw a small but statistically insignificant decline in abnormal returns. On the other hand, Amazon saw a significant spike in stock returns on the day of the incident. American Airlines' stock returns showed a comparatively steady trend without any noteworthy shocks related to the publication of its annual report. Similarly, albeit without statistical significance, Tesla showed a positive impact on stock returns within its event window. These different impacts imply that the market's interpretation of and response to annual reports may be affected by several factors, e.g., particular business circumstances or investor behavior in times of crisis.

Keywords: Annual report, COVID crisis, stock return, investor behavior, event study, abnormal returns.

1. INTRODUCTION

Investors are always looking for strategies to beat the market and generate the highest returns in today's fiercely competitive business environment (Damodaran, 2012). Each year listed companies like Apple, Amazon & Tesla are required to release their annual report, which contains financial statements (Annual Report | Investor.gov, z.d.). Each year listed companies like Apple, Amazon & Tesla are required to release their annual report, which contains financial statements (Annual Report | Investor.gov, z.d.). By extensively studying a company's financial performance and position, provided in these financial statements, potential investment decisions could be made (White et al., 2002d). The value of a company's stock reflects all information about a company that is publicly available according to the efficient market hypothesis (Fama, 1970). As a result, the publication of financial statements may have an immediate impact on the company's stock return.

1.1. Research problem and motivation

Unfortunately, stock prices are not only influenced by the financial performance and position of the company but also by a lot of different factors. Nowadays these other factors that can have an impact on the stock markets are inflation, interest rates, a strong dollar, and sadly the war between Ukraine and Russia (Iacurci, 2022). Not so long ago the global stock markets have been significantly impacted by the COVID-19 pandemic. As governments enforced lockdown measures and companies shut down in the early phases of the epidemic, stock markets all across the world saw dramatic drops. Stocks across several industries were sold off as a result of investor anxiety over the pandemic's possible economic effects (Staff, 2022).

I chose this topic for my thesis because it is crucial for many investors, including myself, to understand if publishing annual reports (including financial statements) significantly affects stock markets even during a crisis. The behavior of many investors may differ during a crisis, because of the occurrence of external economic variables. So, it is important to know whether the release of the financial statements has a significant impact on the decision-making of investors during a crisis. If this is not the case, financial reporting will gradually lose its economic importance. Furthermore, this research will indicate how investors may behave in a future crisis.

1.2. Research objectives

In this paper, the main objective is to look at how the release of annual reports affects the stock prices of publicly listed firms. This study is particularly interested in how the annual reports affected stock prices during the COVID-19 outbreak, because of the numerous outside influences that affected the stock markets at that time. The following research question will be investigated in this paper: *Does the release of a company's annual report during the COVID crisis significantly impact the stock return to forecast the behavior of investors during a future crisis?*

1.3. Social and scientific relevance

In terms of social relevance, regular investors will possibly be more attentive to the company's financial performance during the COVID crisis. An investor's ability to make more informed investment

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choices may be influenced by the fact that annual reports are published and provide valuable information on a company's health (White et al., 2002d). Unfortunately, many investors had already withdrawn their investments before the publication of the Annual Reports. This happened because they had a lot of anxiety about the possible economic impact of the COVID crisis on the world (Staff, 2022). For that reason, it is important to understand whether the Annual Reports have had a significant influence on stock prices during this period, particularly given the presence of external economic variables. In particular in a crisis, as I have already pointed out, if this significant influence does not exist, then the economic value of financial reporting may be called into question.

The influence of the yearly publication of financial results on stock prices is also a key subject of research from a scientific standpoint. The study provides important information about the elements which have a bearing on stock markets' reaction to the annual report releases. To improve investor and finance analysts' judgment, the academic community can help put in place new theories and models which will make it easier for them to perceive how the annual reports influence stock prices.

1.4. Methodology and sample

To determine if the release of annual reports significantly impacts stock prices during the COVID crisis, I will use the event study methodology. This methodology is frequently used in finance and economics research to quantify the effect of a specific event on a financial variable, such as stock prices (Peterson, 1989).

I'll first choose a few publicly listed firms for this analysis. The sample of firms that will be selected for this research is based on the availability of annual report release dates and stock price information in 2020. To guarantee a diversified range of businesses, the sample will be selected from different types of industries and sectors.

Second, I'll gather information on the closing price of a stock on the trading day daily throughout the period around the release of the annual report. I will calculate the abnormal returns based on the five trading days immediately preceding and after the release of the financial statement to identify any possible effects on the stock return. The selection of window size is usually based on actual data and is determined by the particular event being researched.

In event studies, a two-day pre- and post-event window duration is typically utilized since it is long enough to include the majority of the market's reaction to the news while remaining short enough to reduce the impact of unrelated market movements. A five-day event window duration was used in 76.3% of event studies that were examined by (Oler et al., 2007).

Information regarding the publication of the annual reports can be found on the SEC (Securities and Exchange Commission) website, and details about the stock returns during the COVID crisis are obtained from the CRSP database.

1.5. Organization

The remainder of the paper is structured as follows: the first chapter gives some background knowledge regarding the information found especially in the financial statements. This chapter also

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includes information on the development of stock prices, and it concludes with a review of related literature. The hypothesis that is examined in this research is presented in the next chapter. The methodology, which contains the use of an event study for this research, is more thoroughly explained in Chapter 4. The dataset and its source are described in Chapter 5, alongside descriptive statistics. The analysis of the findings is presented in chapter 6. Finally, the conclusion summarizes the findings and discusses the significance of the findings, the limitations of this research, and recommendations for future research.

2. BACKGROUND AND LITERATURE REVIEW

Some background information for the thesis is provided in this chapter. It begins by establishing a baseline knowledge of the information included in the financial statements. In addition, it explains the development of the stock prices. Finally, it examines existing relevant literature on the impact of the publication of the annual report of the company on the stock price.

2.1. Types of financial statements

Financial reporting refers to the use of accepted standards to provide readers of financial statements with an accurate picture of a company's finances, including its sales, costs, profits, capital, and cash flows (Lessambo, 2022). The balance sheet, income statement, and cash flow statement—the three financial reports that firms use most frequently—are included in these statements. A complete explanation of the various types of financial statements is given by the author (Lessambo, 2022) in the following paragraphs.

2.1.1. Balance sheet

First, a company's balance sheet, also known as a statement of financial position, provides an overview of the company's assets, liabilities, and equity at a certain point in time. It depicts the company's assets, which are further classified into (i) current assets (cash, marketable securities, accounts receivable, inventories, prepaid costs, and other current assets), (ii) long-term/fixed assets (such as equipment, land), and (iii) intangibles (such as goodwill, patents, and deferred charges). Similarly, the liabilities section of the balance sheet is separated into (i) current liabilities (i.e., bank advances, income tax payable, accounts payable, accrued costs) and (ii) long-term liabilities (i.e., leases, pensions, long-term bonds). The difference between assets and liabilities constitutes the company's equity ($A - L = E$). A negative equity indicates that the company is technically insolvent.

2.1.2. Income statement

Secondly, one of the most important financial statements requested by the Financial Accounting Standards Board is an income statement. The income statement is sometimes referred to as the profit and loss statement (P&L), statement of operations, or statement of income. It demonstrates whether the company has been profitable over a certain period as referred to in its heading. All income and expenditure over a specified period, together with the cumulative effect of revenue, gain, expense, or loss transactions have been summarised in the income statement.

2.1.3. Cash flow statement

Finally, the statement of cash flows has become a mandatory element for the company's financial statements since 1987. Since it does not take into account the amount of future outgoing and incoming cash which has been recorded on credit, a cash flow report is different from an income statement or balance sheet. This statement enables investors, as well as other readers of financial statements, to understand the way that a company operates and how its cash flows are used.

2.2. Analysis of financial statements

According to (Ehiedu, 2014) it is impossible to overstate the value of financial statement analysis in company decision-making. Businesses must be active in this era of economic liberalization and globalization if they want to ensure their survival in the cutthroat commercial climate. Financial statement analysis is one of the crucial tasks that will help them determine whether or not their financial future is safe. In the words of (Pandy, 2005, as cited in Ehiedu, 2014) "The basis for financial statement analysis is financial information. Financial information is needed to predict, compare and evaluate a firm's earning ability and financial position." Financial statement analysis as defined by (Babatunde, 2007, as cited in Ehiedu, 2014) is "the process of identifying the financial strengths and weaknesses of the firm by properly establishing the relationship between the items of the balance sheet and the profit and loss account".

Between the two authors, Pandy and Babatunde, there is no big difference in the definition of financial statement analysis, however, there are various ways to conduct this analysis. According to (Lessambo, 2022) three frequently used methods are available to conduct financial statement analysis.

2.2.1. Horizontal analysis

To start, horizontal analysis, sometimes referred to as trend analysis, compares financial statement data from many periods to spot patterns and changes. With the use of this technique, trends in a company's financial performance may be found over time. As an illustration, a horizontal study of an organization's income statement may compare sales and costs from one year to the next, but a horizontal examination of its balance sheet might compare the asset and liability values from one quarter to the next. Finding possible financial issues or areas for growth may be done with the use of horizontal analysis.

2.2.2. Vertical analysis

The second approach, often referred to as vertical analysis or common-size analysis, displays each line item on a financial statement as a percentage of a base amount. As a result, comparing many line items within the same financial statement or between financial statements is made straightforward. When a company's income statement and balance sheet are vertically analyzed, each expense may be expressed as a percentage of total revenue and each asset as a percentage of total assets, respectively.

2.2.3. Ratio analysis

Last but not least, ratio analysis is made up of calculating various financial ratios based on information from a company's financial statements. Ratio analysis is an assessment technique that has

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the potential to be used to discover areas of concern as well as potential inside a company. For example, a company's current ratio (current assets divided by current liabilities) evaluates how capable it is to pay off short-term liabilities with current assets, whereas its debt-to-equity ratio (total debt divided by total equity) reflects the rate at which the equity of shareholders is capable of fulfilling a company's obligations to lenders in the case of a bankruptcy.

2.3. Development of stock prices

According to (Kuhlmann, 2014) the financial market is a complicated system that is impacted by several variables. There are innumerable pertinent variables, and every market participant is a highly complicated individual in and of themselves since they are humans. So, this paper will particularly discuss the most relevant factors during a (COVID) crisis.

The stock markets nowadays are heavily influenced by major elements. These high-level phenomena include inflation, interest rate policy by the Federal Reserve, a strong American dollar currency, and the war between Russia and Ukraine (Iacurci, 2022).

2.3.1. Inflation

In a perfect scenario, low-to-moderate inflation, or persistent price increase of 1% to 3% annually, is what the stock market prefers to see. The dollar's value is more constant, there is a stable demand for products and services, and prices are predictable in a "healthy" market. However, when annual inflation rises above this mark, the stock market is overtaken by doubt, volatility, and sluggish consumer spending. Lower economic growth follows, which is poor news for investors and raises questions about value, which may result in subpar stock market performance (Duggan, 2023). On top of that, the study (C et al., 2011) found a long-term association between expected and unexpected inflation and stock returns, while a short-term relationship between these variables is not present for Malaysia or the US, but is present for China.

2.3.2. Interest rate

(F only 1st part) According to the article (How Do Rising Interest Rates Impact the Stock Market? | U.S. Bank, 2022), there are multiple reasons why rising interest rates could affect the stock market. One possibility is that future earnings growth for American companies may be impacted. "As the Fed tightens interest rates, we can expect a decline in economic growth," adds Freedman. GDP rose by 2.1% in 2022, compared to 5.9% in 2021, indicating a considerable downturn. Bonds, certificates of deposit, and other assets provide more appealing returns than equities when interest rates increase, which is another reason why stocks may perform worse. As stated by Rob Haworth, senior investment strategy director of United States Bank Wealth Management, "If interest rates move higher, stock investors become more reluctant to bid up stock prices because they look less attractive versus bonds that pay more competitive yields today." Another factor posing challenges for the equity market, according to Haworth, is the risk that increased debt expenditures caused by high-interest rates may impair firm profitability. "Companies that have to roll over debt in today's market must pay more for that debt." In the view of Haworth, this creates the possibility of declining corporate profitability in the

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future. Stock prices often decrease as earnings do, as is concluded from the research conducted by (Nichols & Wahlen, 2004). In addition, the author (Alam, 2017 (empirically) concludes that interest rates and stock prices in industrialized and emerging countries are significantly negatively related to each other.

2.3.3. Strong U.S. dollar currency

Furthermore, according to (Iacurci, 2022), the U.S. dollar is trading at its highest level in decades compared to currencies like the euro and the pound sterling. This power can "serve as a headwind in many ways," stated Arone. He went on to say that the S&P 500 Index companies produce roughly 45% of their revenue outside of the United States and a strong currency can hurt those earnings, which may lead to a decrease in stock prices (Nichols & Wahlen, 2004).

2.3.4. Ukraine-Russia war

Since the beginning of the war between Ukraine and Russia, global equities markets have had a rocky year. The conflict severely affected the economy and the stock market, including the departure from Russia of some significant international corporations and the removal of Russian firms from the MSCI Emerging Markets Index. The political unpredictability brought on by the conflict and macroeconomic worries like energy-price-driven inflation and increasing rates produced equities market drawdowns for all significant global markets. The spike in inflation also worsened an already critical condition of inflation, which was partially caused by extremely stimulative fiscal and monetary measures taken amid the COVID-19 crisis (*Global Markets One Year After Russia's Invasion of Ukraine*, z.d.)

The Russian invasion of Ukraine made clear that equities markets had a negative geopolitical risk premium factored in. (Chițu, 2022) demonstrated that European equities markets were affected harder than the rest of the globe but later recovered using distance to Kyiv as a proxy for geopolitical risk. In addition, the study conducted by (Boungou & Yatié, 2022) offers the first empirical evidence of the link between the Ukraine-Russian conflict and stock market returns globally.

2.3.5. COVID-19

No other infectious illness epidemic, not even the Spanish Flu, has had such a significant impact on the financial market as the COVID-19 pandemic. With the virus spreading rapidly with no cure in sight, the markets became very volatile, leading to anxious trading and sharp falls of 10% or more: the classic characteristics of a stock market crash (Baker et al., 2020; Staff, 2022). The evidence (Baker et al., 2020) suggests that the main reasons the US stock market reacted so strongly to COVID-19 than previous pandemics are government restrictions on commercial activity and voluntary social distancing, both of which have powerful effects in a service-oriented economy. Policy responses are required to control the virus and level the stock markets; but, unconventional policy interventions, like the United States' limitless QE, generate further uncertainty and may cause long-term difficulties (Engelhardt et al., 2021). Quantitative easing's (QE) goal is to infuse money into the economy to stimulate nominal consumption. The Bank does this by acquiring financial assets from the private sector (Benford et al.,

2006). As earlier stated in the paper, inflation nowadays is partially caused by these policy responses (*Global Markets One Year After Russia's Invasion of Ukraine*, z.d.).

2.4. Partial conclusion

An accurate view of the financial situation of a firm, which includes sales, costs, profit, equity, and cash flow, is intended to be provided by financial statements. These statements comprise the balance sheet, revenue statement, and cash flow statements which are the three main forms of financial reports used by companies. Horizontal analysis, vertical analysis, and ratio analysis have been the three most commonly applied methods to analyze these reports. However, during a (COVID) crisis a lot of external variables can play a role in the development of stock prices such as inflation, interest rate, strong U.S. dollar currency, the Ukraine-Russia war, and the policies/restrictions implemented during the COVID crisis. Therefore, chapter 2.5 will dive deeper into the impact of financial statements on stock prices and the behavior of investors to get a better understanding of the influence of an annual report on stock prices during the COVID crisis.

2.5. Literature review

This literature review aims to provide an in-depth analysis to investigate the impact of financial statements on stock prices and the behavior of investors during a (COVID) crisis, using various insights from prior research.

2.5.1. ECM and public release of annual statements

The Efficient Capital Markets (ECM) hypothesis, first presented by (Fama, 1970), asserts that stock prices accurately and promptly represent all information that is currently accessible. The ECM hypothesis predicts that stock prices will quickly capture the information provided in yearly financial statements in the context of financial statements. Not so long ago an empirical study by (Angilella & Morelli, 2021) was conducted on the impact of the release of these annual financial statements on stock prices, especially in the context of the Dow Jones Industrial Average. The outcome of their research shows that the stock returns have been influenced by the release of the annual financial statements.

2.5.2. Impact of earning numbers on stock prices

So according to (Angilella & Morelli, 2021) the release of financial statements plays a significant role in stock returns, but what about the analysis of the financial statement itself? The role of fundamental analysis in influencing stock prices was the main topic of the study done by (Abarbanell & Bushee, 1997). The purpose of fundamental analysis is to evaluate a company's potential for future earnings by analyzing its financial statement. According to the study, there is a strong association between analysts' profit estimations and stock prices, implying that unanticipated earnings in financial statements can impact stock prices.

Furthermore, (Nichols & Wahlen, 2004) conducted a review of classic accounting research and its implications for stock returns. Their study was based on a revision and expansion of past studies (Ball & Brown, 1968; Kormendi & Lipe, 1987; Bernard and Thomas, 1989, as cited in Nichols & Wahlen, 2004). (Nichols & Wahlen, 2004) provided empirical evidence that earnings numbers were

significantly related to stock returns. Three years after the release of (Nichols & Wahlen, 2004), (Chen & Zhang, 2007) provides additional theories and data that support the idea that accounting factors contribute to cross-sectional stock returns' explanation. Based on (Zhang, 2000, as cited in Chen & Zhang, 2007), whose research links equity value to accounting measures of underlying operations, (Chen & Zhang, 2007) calculate returns as a function of earnings yield, equity capital investment, and changes in profitability, growth opportunities, and discount rates. The roles expected for each of the elements have been supported by empirical findings.

2.5.3. Value- investing, and relevance

(Piotroski, 2000) contributed to understanding how investors can use historical financial statement information to build a high-performing portfolio. This research provides evidence that when an investor creates a portfolio of stocks with a high book-to-market ratio, it can lead to an increase in return by 7.6%. The investment strategy is called 'Value Investing'.

Regarding the concept of 'value', The authors (Dimitropoulos & Asteriou, 2009) investigated the value relevance of financial statements and their influence on stock prices, with a sample of 101 non-financial listed companies at the Athens stock exchange. The results suggest that working capital to total assets and net profit to sales ratios have a negative influence on stock returns, however net profit to total assets and sales to total assets ratios have a favorable impact.

The author (Dung, 2016) also researched the value relevance of financial statement information, but they performed their research based on the companies listed on the Vietnamese stock market. The research (Dung, 2016) is based on the famous Ohlson model. Ohlson (1995) contributed to the accounting literature by investigating the significance of dividends, book values, and earnings in valuing stocks. His research was primarily focused on creating a valuation model incorporating these accounting data.

Contrary to widely held beliefs, the results (Dung, 2016) demonstrate that there is a statistically significant association between financial statement information and stock prices in Vietnam, even though that is considerably less than in other established and emerging markets. Additionally, there are indications that earnings and book value are reflected in stock prices with a lag and that during moments of the stock market boom, the value-relevance of earnings increases significantly.

2.5.4. Investor behavior during a crisis

The aim of this paper is not merely to provide evidence on whether the release of the annual financial statements has a significant impact on stock returns in general, but more specifically during the COVID crisis. So, it is important to understand how investors behave in the past during previous crises.

During the 2008–2009 financial crisis, (Hoffmann et al., 2013) studied individual investor perceptions and behavior. Their research showed that investors' return expectations and risk tolerance decreased as their perceptions of risk increased during the crisis' worst months. Investor attitudes did, nevertheless, begin to improve as the crisis came to an end. Individual investors do not de-risk their

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investment portfolios during the crisis, in contrast to widely held ideas and predictions from earlier work. Additionally, individual investors do not endeavor to lower risk by switching from riskier investments to cash. Individual investors instead take advantage of the low asset values to participate in the stock market. Furthermore, a great deal of research has been focused on the more recent COVID-19 pandemic because of its unparalleled effects on the world's economy and financial markets. The COVID-19 crisis's impact on investor behavior was investigated by (Ortmann et al., 2020). According to their research, when the number of COVID-19 cases doubles, more investors open their first accounts with the broker, while simultaneously experienced investors double their average trading activity. Investors also somewhat enhance their propensity to engage in short selling. As the crisis worsens, trading in stocks picks up most for sectors that typically incur losses. In this case, early short selling at the start of February 2020 mostly affects travel-related businesses.

3. HYPOTHESIS

Any recent information that is price-relevant is instantly reflected in the stock price in an efficient market. The Efficient-Market Hypothesis was created by Professor Eugen Fama of the University of Chicago. So, if no other event occurs on a particular day and the market is assumed to be efficient, the change in stock price may be regarded as the price impact of that occurrence (Fama, 1970). The primary theoretical foundation for the event study methodology is the efficient-market hypothesis. Based on the Efficient-Market Hypothesis, even during the COVID crisis, I expect that the release of a company's annual report will still be respected by the stock market. In addition, the researchers (Angilella & Morelli, 2021; Dimitropoulos & Asteriou, 2009; Dung, 2016; Chen & Zhang, 2007; Nichols & Wahlen, 2004) provided evidence on the impact of information stated in the financial statements on stock returns in general. However, the authors (Hoffmann et al., 2013; Ortmann et al., 2020) concluded that both the financial- and COVID crises influenced investors' behavior. During the COVID crisis, investors increased their tendency to sell short.

Even though a lot of external factors were involved during the COVID crisis period.

I formulate the following hypothesis:

***H1:** The release of a company's annual report will significantly impact the stock return in a negative direction during the COVID crisis.*

4. METHODOLOGY

The objective of this chapter is to outline the methodology that is used to evaluate the hypothesis established in [Chapter 3](#).

4.1. Research design

This study employs an event study to answer the research question. The event study approach is frequently used in finance and economics research to quantify the effect of a specific event on a financial variable, such as stock prices (Peterson, 1989). In this study, the impact of the release of a company's annual report on the stock price, the event, is investigated by observing the concerned stock returns.

4.1.1. Estimation -and observation period

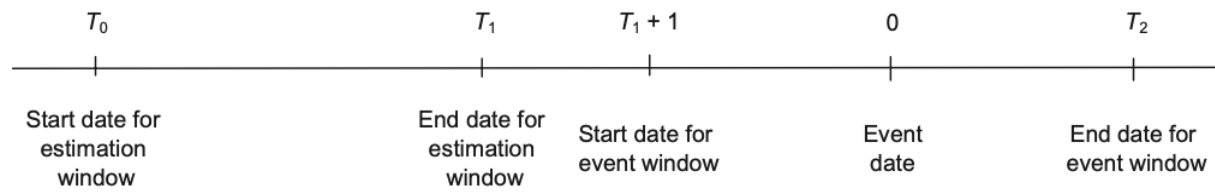


Figure 4.1.1.1. The Event-Study Time Line

Adapted source: Benninga, 2008

According to a study conducted by (Holler, 2014), the durations of the estimate windows generally range from 30 to 750 days. However (Armitage, 1995; Park, 2004) provides evidence that it is safer to use an estimation window with a minimum of 100 days because the sensitivity of findings, such as the expected return on the event date, will not be sensitive to altering estimation window lengths at that stage. So, this study makes use of an estimation window of 120 days, which will end 10 days before the start of the event window. It is advised to leave a gap between the end of the estimation window and the start of the event window to create a better separation between the windows (Benninga, 2008).

Furthermore, this study will utilize a (-2, +2) event window duration since it is long enough to include the majority of the market's reaction to the news while remaining short enough to reduce the impact of unrelated market movements. A 5-day event window duration was used in 76.3% of event studies that were examined by (Oler et al., 2007). [Figure 4.1.1.1.](#) lines out what the event study looks like.

4.1.2 Measurement of abnormal returns

An event study aims to ascertain if a particular occurrence or statement contributed to an abnormal shift in a company's stock price. The estimation window, as its name suggests, is used to calculate a model of the stock's returns under "normal" conditions. The market model, which is a regression of stock returns and market index returns, is the model that is most frequently employed for this purpose. The Market Model for a stock is presented as:

$$r_{it} = \alpha_i + \beta_i r_{Mt} \tag{4.1.2.1}$$

In this study, r_{it} represents the stock return of a company and r_{Mt} represents the return of a stock market index on day t . An ordinary least-squares regression is used to estimate the coefficients α_i and β_i over the estimation window. The influence of the release of an annual report on the stock's return is calculated in the event window given the equation of the market model in the estimation window. The stock's abnormal return (AR), defined for a certain day t in the event window, is the distinction between its actual return and the return forecasted by the following equation:

$$AR_{it} = r_{it} - (\alpha_i + \beta_i r_{Mt}) \tag{4.1.2.2}$$

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This equation for the AR can be interpreted as the impact of the event on the stock price, during the event window. This interpretation of the stock's market value change presupposes that the event is exogenous (Benninga, 2008).

4.2. Statistical analysis

All analyses in this study are conducted in the statistical software STATA. The significance of abnormal returns is evaluated using a significance threshold of 5% to decide whether to reject the null hypothesis or come to the conclusion that there is insufficient evidence to reject it. The significance threshold of 5% was chosen because R.A. Fisher, a renowned statistician, supported it as a standard level for determining evidence against the hypothesis tested (Dahiru, 2011).

In this study, two forms of the null and alternative hypotheses are used:

$$H_0: E(CAR_t) = 0 \text{ vs. } H_1: E(CAR_t) \neq 0 \quad (4.2.1)$$

and

$$H_0: E(CAR_t) = 0 \text{ vs. } H_1: E(CAR_t) < 0 \quad (4.2.2)$$

CAR_t (Cumulative abnormal return) is the sum of all the abnormal returns from the beginning of the event window T_1 until a particular day t in the window (Benninga, 2008):

$$CAR_t = \sum_{j=1}^t AR_{T_1+j} \quad (4.2.3)$$

The reason for the use of two hypothesis test is to evaluate whether the release of the annual report has a statistically significant impact on the company's abnormal returns (4.2.1), as well as to evaluate whether the release of the annual report has a statistically significant negative impact on the company's abnormal returns (4.2.2).

The t-statistic used for this study is as follows (Ahn & Wolf, 2023):

$$T_{CAR} = \frac{1}{\sqrt{M}} * \frac{CAR}{S_N} \sim t_{N-K} \quad (4.2.4)$$

M represents the size of the event window, N represents the size of the estimation window, and S_N is the standard deviation of the abnormal return estimated from the beginning of the estimation window T_0 until a particular day t in the window. K represents the number of parameters that were estimated to compute the abnormal returns, which in this case is equal to two as from Model (4.1.2.2) only α_i and β_i are estimated.

In addition to the t-statistic (4.2.4), STATA calculates a p-value as output. The P value is defined as the likelihood of receiving a result equal to or more extreme than what was observed under the premise of no impact or difference (null hypothesis) (Dahiru, 2011). As stated earlier, a significance threshold of 5% is used in this study, which is equal to the critical value of -1.96 or 1.96 when a two-sided test (4.2.1) is performed. So, if $t < -1.96$ or $t > 1.96$, the variable $E(CAR_t)$ will be statistically significant. Furthermore, when a one-sided test (lower bound) (4.2.2) is performed the critical value will be -1.645. So, if $t < -1.645$, the variable $E(CAR_t)$ will be statistically significant in a negative direction.

4.3. Data source

The data used for this thesis regarding the release of the annual reports can be found on the Securities and Exchange Commission (SEC) website. The SEC's goals are to safeguard investors, keep markets fair, orderly, and efficient, and promote capital formation. The SEC works to establish a marketplace that is trustworthy in the eyes of the general public (*SEC.gov / About the SEC*, 2017).

Information about daily stock returns during the COVID crisis is obtained from the CRSP database. The most complete collection of securities price, return, and volume data for the NYSE, AMEX, and NASDAQ stock exchanges is kept by the Center for Research in Securities Prices, LLC (CRSP). Stock indices, beta-based and cap-based portfolios, government bonds and risk-free rates, mutual funds, and real estate information are all included in additional CRSP files (Wharton Research Data Services, z.d.).

4.4. Sample selection

For this event study, the focus is particularly on companies selected from the S&P 500 stock market index, whereby r_{Mt} will represent the S&P 500 stock market index for the Market Model (4.1.2.1).

4.4.1. Market representation

The S&P 500 is a well-known stock market index made up of 500 publicly listed, American businesses with substantial market capitalization. Many people believe that the performance of the S&P 500 is a good indicator of the performance of the high-market-cap segment of the stock market as a whole because it concentrates on companies with high market capitalization. A lot of investors use the index to determine how the stock market is doing (Salvucci, 2023).

This study intends to capture the dynamics of a variety of businesses and sectors by selecting companies from the S&P 500 for the event study, hence promoting the generalizability and application of the results.

4.4.2. Availability of information

Regulators like the SEC (Securities and Exchange Commission) place strict reporting and disclosure requirements on companies that are listed on the S&P 500 (SEC.gov | Exchange Act Reporting and Registration, 2017). To avoid a fine, companies have no other choice but to provide complete and up-to-date financial information. Which in addition simplifies the process of collecting relevant data to carry out event studies.

4.4.3. Liquidity

When compared to mid-cap or small-cap equities, S&P 500 companies often have significant trading volumes, making them highly liquid (Institutional Shareholder Services, 2021). The higher its liquidity, the more effectively a market incorporates information into pricing. By lowering the possibility of price distortions, the enhanced liquidity will make it easier to complete transactions effectively inside the event window (Chung & Hrazdil, 2010). The results of the event study are therefore more precise and accurate when S&P 500 businesses are used.

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4.4.4. Companies selected

For this event study the following four companies are selected:

- *Apple*: A firm that sells mobile phones, tablets, and laptop computers.
- *Amazon*: An online retailer that offers everything from shoes to laptops.
- *American Airlines*: As the name implies is the largest American airline corporation.
- *Tesla*: A company that mainly specializes in manufacturing electric cars.

The rationale for choosing a variety of companies instead of one random company is that each firm comes from a different industry within the S&P 500, and the effect of COVID can result in various implications depending on the industry (Vidovic, 2022).

Tables ([4.4.4.1](#), [4.4.4.2](#), [4.4.4.3](#), and [4.4.4.4](#)) contain each company's descriptive statistics of the variables used to estimate the Market Model ([4.1.2.1](#)) via an OLS regression.

Table 4.4.4.1

Descriptive Statistics (Apple)

Variable	Obs	Mean	Std. Dev.	Min	Max
Return	120	.005	.024	-.08	.105
SP500 rtn	120	.002	.013	-.059	.032

Note. Return is Apple's daily stock returns in a timeframe of 120 days, which ended 10 days prior to the event. SP500 rtn is the daily stock return of the S&P 500 stock market index in a timeframe of 120 days, which ended 10 days prior to the event.

Table 4.4.4.2

Descriptive Statistics (Amazon)

Variable	Obs	Mean	Std. Dev.	Min	Max
Return	120	0	.012	-.034	.044
SP500 rtn	120	.001	.008	-.03	.019

Note. Return is Amazon's daily stock returns in a timeframe of 120 days, which ended 10 days prior to the event. SP500 rtn is the daily stock return of the S&P 500 stock market index in a timeframe of 120 days, which ended 10 days prior to the event.

Table 4.4.4.3

Descriptive Statistics (American Airlines)

Variable	Obs	Mean	Std. Dev.	Min	Max
Return	120	0	.023	-.073	.054
SP500 rtn	120	.001	.007	-.029	.015

Note. Return is American Airlines' daily stock returns in a timeframe of 120 days, which ended 10 days prior to the event. SP500 rtn is the daily stock return of the S&P 500 stock market index in a timeframe of 120 days, which ended 10 days prior to the event.

Table 4.4.4.4

Descriptive Statistics (Tesla)

Variable	Obs	Mean	Std. Dev.	Min	Max
Return	120	.008	.031	-.075	.177
SP500 rtn	120	.001	.008	-.029	.019

Note. Return is Tesla's daily stock returns in a timeframe of 120 days, which ended 10 days prior to the event. SP500 rtn is the daily stock return of the S&P 500 stock market index in a timeframe of 120 days, which ended 10 days prior to the event.

5. RESULTS

This chapter discusses the findings from the event study done to determine how a company's (Apple, Amazon, American Airlines, Tesla) annual report released during the COVID crisis affected its stock return. The event study is conducted in STATA, and the significance of cumulative abnormal return (CAR) (4.2.3) is evaluated using a significance level of 5% to decide whether to reject the null hypothesis or come to the conclusion that there is insufficient evidence to reject it (4.2.1) (4.2.2). The hypothesis stated in Chapter 3 is repeated below:

H1: The release of a company's annual report will significantly impact the stock return in a negative direction during the COVID crisis.

The results of each company will be discussed separately.

5.1. Market Model

This part provides the results of the Market Model's (4.1.2.1) ordinary least-squares regression, which is estimated through the estimation window (120 days). The ordinary least-squares regression is utilized to estimate the coefficients α_i and β_i over the estimation window.

5.1.1 Market Model: Apple

Table 5.1.1.1

OLS regression results: Market Model (4.1.2.1) for Apple

Return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
SP500 rtn	1.233	.127	9.70	0	.982	1.485	***
Constant	.003	.002	1.53	.13	-.001	.006	
Mean dependent var		0.005	SD dependent var			0.024	
R-squared		0.444	Number of obs			120	
F-test		94.041	Prob > F			0.000	
Akaike crit. (AIC)		-617.759	Bayesian crit. (BIC)			-612.184	

Note. *** $p < .01$, ** $p < .05$, * $p < .1$

Analysis of Table 5.1.1.1 reveals that the constant term of the Market Model (4.1.2.1) (α_i) is equal to 0.003 and that the coefficient for daily S&P 500 index returns of the Market Model (β_i) is equal to 1.233. The daily S&P 500 index return coefficient (β_i) appears to be statistically significant,

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demonstrating that there is a significant relationship between the daily stock returns of the S&P 500 index and Apple's daily stock returns, as shown by the provided t-value ($9.70 > 1.96$) and p-value ($0 < 0.05$). The daily stock returns for Apple grow by 1.233 units for every additional unit in the S&P 500 returns. The constant term (α_i), on another hand, is not statistically significant according to the t-value ($1.53 < 1.96$) and p-value ($0.13 < 0.05$).

The R-squared for Apple's regression model is equal to 0.444, which shows that 44.0% of the variation in Apple's returns can be explained through the variation in the returns of the S&P 500 index. On top of that, based on the F-test which is equal to 94.041 the model appears to be statistically significant overall as the p-value ($0.001 < 0.05$).

5.1.2. Market Model: Amazon

Table 5.1.2.1

Linear regression results: Market Model (4.1.2.1) for Amazon

Return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
SP500 rtn	1.12	.091	12.25	0	.939	1.301	***
Constant	-.001	.001	-1.70	.092	-.003	0	*
Mean dependent var		-0.000	SD dependent var			0.012	
R-squared		0.560	Number of obs			120	
F-test		150.087	Prob > F			0.000	
Akaike crit. (AIC)		-816.203	Bayesian crit. (BIC)			-810.628	

Note. *** $p < .01$, ** $p < .05$, * $p < .1$

Analysis of [Table 5.1.2.1](#) reveals that the constant term of the Market Model (4.1.2.1) (α_i) is equal to -0.001 and that the coefficient for daily S&P 500 index returns of the Market Model (β_i) is equal to 1.12. The daily S&P 500 index return coefficient (β_i) appears to be statistically significant, demonstrating that there is a significant relationship between the daily stock returns of the S&P 500 index and Amazon's daily stock returns, as shown by the provided t-value ($12.25 > 1.96$) and p-value ($0 < 0.05$). The daily stock returns for Amazon grow by 1.12 units for every additional unit in the S&P 500 returns. The constant term (α_i), on another hand, is not statistically significant according to the t-value ($-1.70 > -1.96$) and p-value ($0.092 > 0.05$).

The R-squared for Amazon's regression model is equal to 0.560, which shows that 56.0% of the variation in Amazon's returns can be explained through the variation in the returns of the S&P 500 index. On top of that, based on the F-test which is equal to 150.087 the model appears to be statistically significant overall as the p-value ($0.000 < 0.05$).

5.1.3. Market Model: American Airlines

Table 5.1.3.1

Linear regression results: Market Model (4.1.2.1) for American Airlines

Return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
SP500 rtn	1.918	.223	8.60	0	1.476	2.359	***
Constant	-.002	.002	-1.20	.232	-.005	.001	
Mean dependent var		-0.000	SD dependent var			0.023	
R-squared		0.385	Number of obs			120	
F-test		74.014	Prob > F			0.000	
Akaike crit. (AIC)		-623.969	Bayesian crit. (BIC)			-618.394	

*Note. *** $p < .01$, ** $p < .05$, * $p < .1$*

Analysis of [Table 5.1.3.1](#) reveals that the constant term of the Market Model (4.1.2.1) (α_i) is equal to -0.002 and that the coefficient for daily S&P 500 index returns of the Market Model (β_i) is equal to 1.918. The daily S&P 500 index return coefficient (β_i) appears to be statistically significant, demonstrating that there is a significant relationship between the daily stock returns of the S&P 500 index and American Airlines' daily stock returns, as shown by the provided t-value (8.60) > 1.96 and p-value (0) < 0.05. The daily stock returns for American Airlines grow by 1.918 units for every additional unit in the S&P 500 returns. The constant term (α_i), on another hand, is not statistically significant according to the t-value (-1.20) > -1.96 and p-value (0.232) > 0.05.

The R-squared for American Airlines' regression model is equal to 0.385, which shows that 38.5% of the variation in American Airlines' returns can be explained through the variation in the returns of the S&P 500 index. On top of that, based on the F-test which is equal to 74.014 the model appears to be statistically significant overall as the p-value (0.000) < 0.05.

5.1.4. Market Model: Tesla

Table 5.1.4.1

Linear regression results: Market Model (4.1.2.1) for Tesla

Return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
SP500 rtn	1.184	.36	3.28	.001	.47	1.898	***
Constant	.007	.003	2.41	.017	.001	.012	**
Mean dependent var		0.008	SD dependent var			0.031	
R-squared		0.084	Number of obs			120	
F-test		10.788	Prob > F			0.001	
Akaike crit. (AIC)		-501.886	Bayesian crit. (BIC)			-496.311	

*Note. *** $p < .01$, ** $p < .05$, * $p < .1$*

Analysis of [Table 5.1.4.1](#) reveals that the constant term of the Market Model (4.1.2.1) (α_i) is

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equal to 0.007 and that the coefficient for daily S&P 500 index returns of the Market Model (β_i) is equal to 1.184. The daily S&P 500 index return coefficient (β_i) appears to be statistically significant, demonstrating that there is a significant relationship between the daily stock returns of the S&P 500 index and Tesla's daily stock returns, as shown by the provided t-value ($9.70 > 1.96$ and p-value ($0.001 < 0.05$). The daily stock returns for Tesla grow by 1.184 units for every additional unit in the S&P 500 returns. In comparison to the previous companies (Apple, Amazon, American Airlines), Tesla's constant term (α_i) is statistically significant according to the t-value ($2.41 > 1.96$ and p-value ($0.017 < 0.05$).

The R-squared for Tesla's regression model is equal to 0.084, which shows that only 8.4% of the variation in Tesla's returns can be explained through the variation in the returns of the S&P 500 index. However, based on the F-test which is equal to 10.788 the model appears to be statistically significant overall as the p-value ($0.001 < 0.05$). It is not necessary to look at F-test in the case of Tesla, as both the constant term (α_i) and the daily S&P 500 index return coefficient (β_i) appear to be statistically significant.

5.2. Significance of cumulative abnormal return

The influence of the release of an annual report on the stock's return is calculated in the event window given the equation of the Market Model [\(4.1.2.1\)](#) in the estimation window. The stock's abnormal return (AR), defined for a certain day t in the event window, is the distinction between its actual return and the return forecasted by Model [\(4.1.2.2\)](#). This part will discuss whether the cumulative abnormal return (CAR) [\(4.2.3\)](#) during the event window displays statistical significance in comparison to the estimation window [\(4.2.1\)](#) [\(4.2.2\)](#).

5.2.1. Significance of cumulative abnormal return: Apple

After conducting the statistical analysis, a t-statistic equal to -1.400236 is computed for Apple. This translates to the cumulative abnormal return, estimated throughout the event window, not being statistically significant. CAR [\(4.2.3\)](#) is not statistically significant, because -1.400236 is bigger than the critical values of -1.96 and -1.645 ($t > -1.96$ & $t > -1.654$). So, unfortunately, there is not enough statistical evidence to reject the null hypothesis for the one-sided test as well as the two-sided test. However, [Figure 5.2.1.1](#) shows that on the day of Apple's annual report release, there was a decline in Apple's AR [\(4.1.2.2\)](#) of -4%. So, the release of the annual report had an impact on the stock returns of Apple, but not a significant one. Although the t-statistic of -1.400236 was not too far away from the critical value of the one-sided test [\(4.2.2\)](#)

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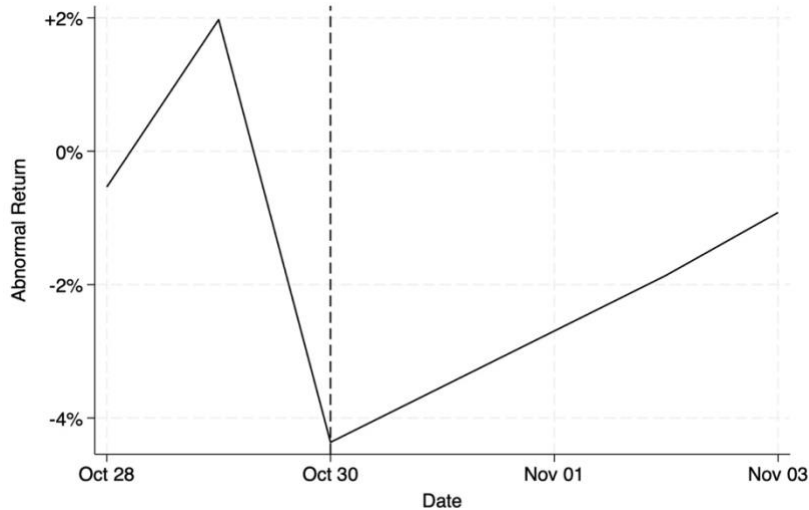


Figure 5.2.1.1. Abnormal returns of Apple during the event window.

However, [Figure 5.2.1.1.](#) shows that on the day of Apple's annual report release, there was a decline in Apple's AR ([4.1.2.2](#)) of -4%. So, the release of the annual report had an impact on the stock returns of Apple, but not a significant one. Although the t-statistic of -1.400236 was not too far away from the critical value of the one-sided test ([4.2.2](#))

5.2.2. Significance of cumulative abnormal return: Amazon

The computed t-statistic for Amazon is equal to 5.737817. This outcome demonstrates that in the case of Amazon, the cumulative abnormal return estimated during the event window is statistically significant. If the two-sided hypothesis test ([4.2.1](#)) is performed, the CAR ([4.2.3](#)) is statistically significant since 5.737817 exceeds the crucial value of 1.96 ($t > 1.96$). Therefore, there is sufficient statistical evidence to reject the null hypothesis. However, no statistical evidence exists to reject the null hypothesis when a one-sided test ([4.2.2](#)) is performed because $t > -1.654$.

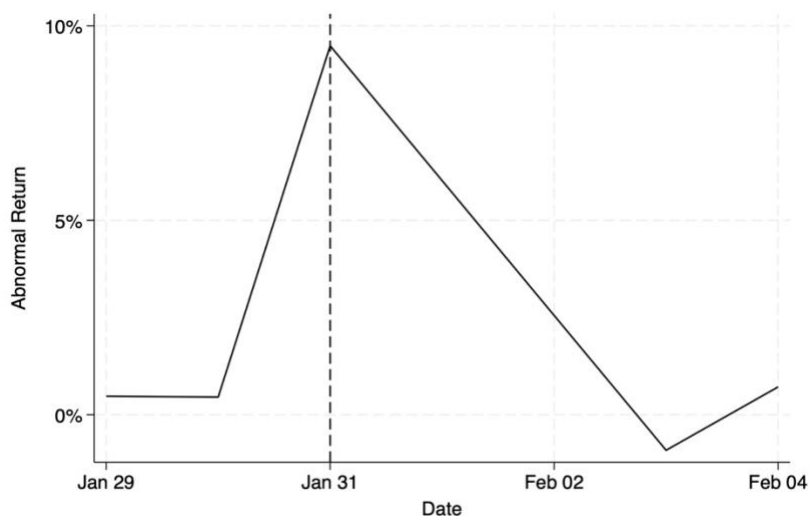


Figure 5.2.2.1. Abnormal returns of Amazon during the event window.

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[Figure 5.2.2.1](#), displays the abnormal returns of Amazon during the event window, and it makes clear why CAR [\(4.2.3\)](#) is statistically significant. On the day of Amazon's annual report release, there was a huge increase of almost 10% in its AR [\(4.1.2.2\)](#). On the days after the event, it looks like the abnormal returns are cooling down, and even turning negative on Feb 03. However, the increase in Amazon's AR on the day of the event was too large to neglect.

5.2.3. Significance of cumulative abnormal return: American Airlines

A t-statistic with the value 1.490989 is computed for American Airlines. In other words, the cumulative abnormal return estimated throughout the event window is not statistically significant. For the two-sided hypothesis test [\(4.2.1\)](#), CAR [\(4.2.3\)](#) is not statistically significant since 1.490989 is smaller than the crucial value of 1.96 ($t < 1.96$). A similar lack of statistical significance for CAR is seen in the one-sided test [\(4.2.2\)](#) because ($t > -1.654$). So, unfortunately, there is not enough statistical evidence to reject the null hypothesis in both scenarios.

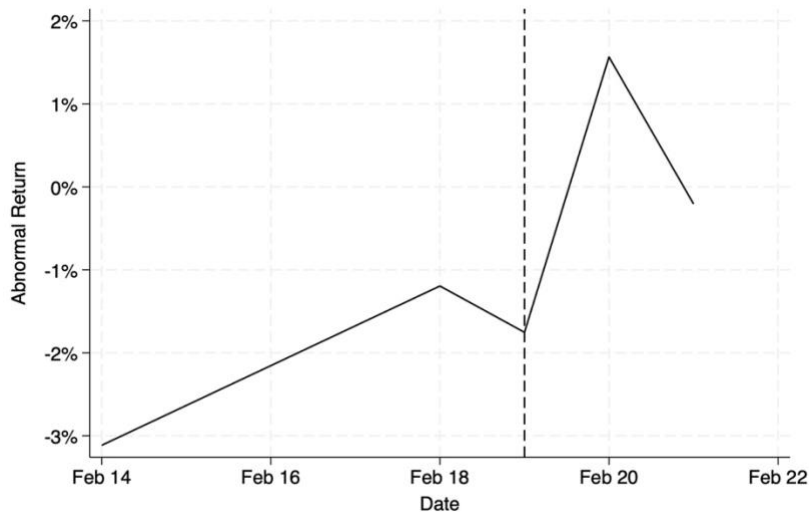


Figure 5.2.3.1. Abnormal returns of American Airlines during the event window.

[Figure 5.2.3.1](#) depicts American Airlines' AR [\(4.1.2.2\)](#) depicts American Airlines' AR as though practically nothing happened. as though practically nothing happened. There was a decline of about -1.5% on the day of the event, but on the days after it started to go upwards. On Feb 20 the complete opposite happened, an increase of 1.5% in AR. So, it looks like not much surprising happened, especially in comparison to Amazon, during the event window. Hence CAR [\(4.2.3\)](#) is not statistically significant.

5.2.4. Significance of cumulative abnormal return: Tesla

Last but not least, the t-statistic computed for the electric car manufacturer Tesla is equal to 1.079662. This indicates that the cumulative abnormal return calculated during the event window is not statistically significant. CAR [\(4.2.3\)](#) is not statistically significant, because 1.079662 is too small for

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the two-sided hypothesis test (4.2.1) ($t < 1.96$) and too big for the one-sided test (4.2.2) ($t > -1.654$). So, unfortunately, in both cases, there is not enough statistical evidence to reject the null hypothesis.

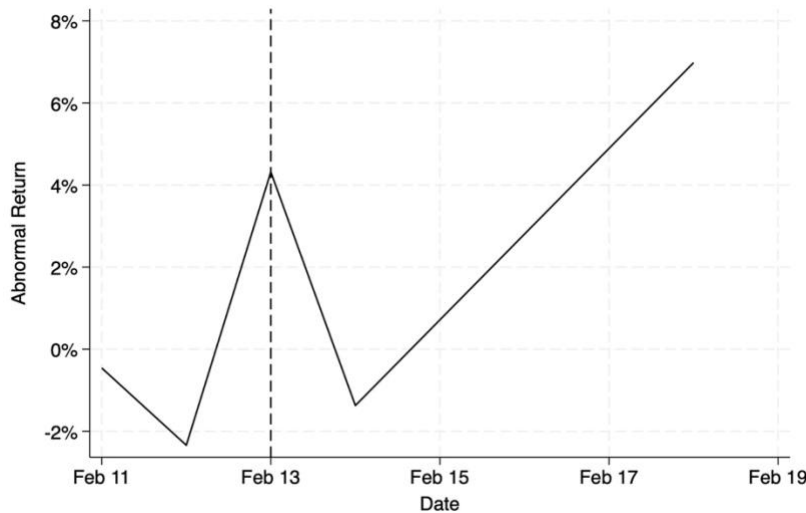


Figure 5.2.4.1. Abnormal returns of Tesla during the event window.

Figure 5.2.4.1. gives an interesting visual of Tesla's event window. The day Tesla's annual report became available to the public, an increase of about 4% in Tesla's AR (4.1.2.2). A negative AR occurred one day after the release, but in the upcoming days, AR climbed to an increase of about 7%. So, even though CAR (4.2.3) is not statistically significant for Tesla, shows a clear positive impact on the abnormal returns.

5.3. Summary of findings

These results shed light on the market's reaction to the release of annual reports during the COVID crisis. The results show that annual report releases had diverse effects on Apple, Amazon, American Airlines, and Tesla stock returns. Apple saw a small but not statistically significant reduction in AR. On the day of the event, Amazon showed a huge increase in AR, which led to the rejection of the null hypothesis. The AR for American Airlines revealed a generally steady trend without any significant shocks. On the other hand, Tesla showed a clear positive influence on AR during its event window, but the effect was insignificant.

6. CONCLUSION

This study investigated, whether the release of a company's annual report during the COVID crisis significantly impacts the stock return to forecast the behavior of investors during a future crisis. After utilizing an event study, the findings concluded that the release of the annual report affected each company differently. Apple saw a small but statistically insignificant decline in abnormal returns. On the other hand, Amazon saw a substantial spike in stock returns on the day of the incident, which caused the null hypothesis to be rejected. American Airlines' stock returns showed a comparatively steady trend

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without any noteworthy shocks related to the publication of its annual report. Similarly, albeit without statistical significance, Tesla showed a positive impact on stock returns within its event window.

These different impacts imply that the market's interpretation of and response to annual reports may be affected by several factors, e.g., particular business circumstances or investor behavior in times of crisis (Hoffmann et al., 2013; Kuhlmann, 2014; Ortmann et al., 2020; Vidovic, 2022). The material in the annual report appears to have been well received by investors, given that Amazon's stock price increased significantly on the day it was published. A response like that, which might encourage investors' trust in the profitability and strategic orientation of Amazon, could result from effective communication and transparency within the Annual Report. However, the lack of a statistically significant impact on the stock returns of Tesla, American Airlines, and Apple concerning their annual reports during the COVID crisis makes it more likely that this information has had less influence on investors.

Although this study provides useful information regarding the relationship between releasing Annual Reports during the COVID crisis and stock returns, some limitations are to be noted. In the first place, this analysis is aimed at a small number of enterprises such as Apple, Amazon, American Airlines, and Tesla which might not be very representative in comparison to the overall behavior on the market. Consequently, the generalization of these findings to other companies or sectors should be carried out with due care. Furthermore, it is not always easy to establish exactly how the Annual Report during the COVID crisis has affected stock returns. The financial market is a complicated system that is impacted by several variables (Kuhlmann, 2014). Particularly for that reason, this study has incorporated a small event window size (-2, +2) to avoid additional external variables and events affecting the stock returns. Nevertheless, these external variables may influence stock returns during the event window but this effect has not been specifically assessed.

To strengthen the foundation of this study and better comprehend the relationship between the release of annual reports during a crisis and investor behavior several directions for future research are recommended. First, a larger sample size would give a more complete picture of how annual report releases affect stock returns during crises by taking into account a wider range of companies from various industries. Secondly, comprehension of the mechanisms by which these impacts have been found will increase if other elements that can influence investor behavior are taken into account, for example, economic indicators, industrial particular variables, and market sentiment. Consequently, a more precise analysis is possible of specific variables that are playing a role in the market's reaction to the release of annual reports. Finally, performing qualitative research with investors and financial analysts, such as conducting interviews or surveys, might offer insightful information on their decision-making procedures and assessments of annual reports during crises. Such a method of study, in addition to giving more insight into the variables affecting investor behavior and expectations about difficult and uncertain market conditions, would be complementary to studies carried out by a quantitative approach.

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