Erasmus School of Economics

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Master Thesis Strategy Economics

Effects of new product announcements and market launches: insights from the automotive industry and BMW's electric transformation

Name student: Vilmos Szabó

Student ID number: 553181

Supervisor: Dr. Eleftheria Triviza
Second assessor: Dr. Ajay Bhaskarabhatla

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Executive Summary

A new age of technology is transforming the competitive landscape of the European automotive industry. Manufactures like BMW who've built their success on their combustion engine vehicles must turn to electric platforms to meet the changing needs of the market and regulatory requirements that focus on climate-mitigation. BMW's incremental release of new electric vehicles and the impact they have on its performance and value can give insights to the future trajectory of BMW's success. An event study methodology is employed to study the direct impact of the official announcements and market launches of 6 new electric vehicles from BMW. The results indicate that the official announcements of models which are either built on a new electric platform or are backed by high expectations and hype result in positive and significant effect on BMW's performance and value. However, cheaper entry-level models remained insignificant due to their low-impact supplementary nature. The market launch of all but one model resulted in an insignificant impact, suggesting all information and expectations have already been reflected in the stock prices prior to the market launch. Firms undergoing large strategic decisions in a shifting market environment can use new products to grow and innovate and should not be afraid of releasing lower class, less impactful products. However, firms should ensure they meet consumer and investor expectations for products which have a high level of excitement and reputation to avoid potential losses in the event those expectations are not met. This study concludes that BMW's trajectory for success in this shifting industry is positive, and future research should delve into large-scale analyses between BMW and its competitors, to depict the future performance of not only a singular brand, but the market as a whole.

Table of Contents

Chapter 1: Introduction

1.1 Introduction to the subject

The European automotive industry is undergoing its most significant transformation of technology since the invention of the combustion engine itself. The adoption of electric powertrains over classical gasoline powertrains presents a large hurdle for manufacturers to overcome as such a transformation requires all brands to alter both their product portfolios and general approach to the new customer preferences and market dynamics. This large change is in accordance with EU regulations that will eventually ban the manufacturing of gasoline powered vehicles (for as long as there are no alternative fuel options available). Due to the sudden and radical shift in technology, it is difficult to determine which brands will soar in the new market, and which brands will diminish.

BMW is a premium German automotive manufacturer and is one of the most recognizable and influential brands within the industry (*BMW Group*, 2023). BMW is notorious for their comprehensive vehicle offerings, most notably their sporty M-division vehicles which have powerful and unique petrol-powered engines that attract a wide array of consumers. BMW is not inexperienced in the electric sector as evident by their early electric vehicle introductions in late 2013 (*BMW Model List*, 2023) however, the pace of their new vehicle introductions have rapidly increased in recent years to accommodate the new regulations.

The focal point of this study is to examine whether BMW, a historically successful and dynamic vehicle manufacturer is experiencing a successful transformation to the new electric age. This will be examined using an event study methodology, specifically estimating the impact on BMW's stock returns with each announcement and market launch of their 6 most recent electric vehicle offerings.

1.2 Relevancy of the subject

The effect of the introduction of strict climate change mitigating policies and regulations can already be observed in numerous other sectors, for example fossil/renewable energies, agriculture, and construction/manufacturing services. The aim of each policy is to edge the respective sectors or markets to act more sustainably and to ensure that all parties are abiding by the new rules and are actively reducing their climate impact. However, such actions are difficult to incentivize and often face backlash from consumers and producers alike, as being climate-friendly is costly, results in changes to products, and most importantly is against the interests of most profit-seeking entities. The automotive industry is especially interesting as the introduction of the EU climate pact to ban petrol powered vehicles was swiftly put in motion with initially a supportive acceptance from manufacturers, but as the deadlines creep closer,

manufacturers and even nations can be seen fighting back to potentially delay or even alter the regulations in their entirety. (*Euronews*, 2023).

The automotive industry, prior to this large disruption in technology, was mature and the main manufacturers were of European nationalities. The industry resulted in enormous success for Europe with more than 1 trillion Euros contribution to EU GDP in 2022, employment of 13.8million workers and approximately 60 billion Euros annual spending in R&D (Cornet, Heuss, Schaufuss & Tschiesner, 2023). Since then, according to Kane (2024), BMW was second to Tesla in the share of plug-in electric vehicle sales with 8.8%, while Tesla had 12.1%. BMW's competitors Volkswagen, Mercedes-Benz and Audi had a share of 8.2%, 7.8% and 5.8% respectively (Kane, 2024). However, because of the technological and regulatory disruptions, these historic strengths of the European automotive industry are threatened by the accelerating external entry from large players such as China, as Chinese entrants benefit from low cost, high budget electric vehicle developments (Cornet, Heuss, Schaufuss & Tschiesner, 2023). Thus, local industry leaders such as BMW face a fierce obstacle in navigating a new regulatory and technological environment, as well as a rapid increase of entry from foreign competition into the European market.

Lastly, studying the impact of this transformation on a historically successful brand such as BMW will present insights into the performance of both the market and an evaluation of the current trajectory that BMW is on with their electric vehicle releases. While there are numerous publications of research in the field of transformation or the effect of product releases, this thesis stands out on its own by exploring a very recent and still ongoing shift in a market. Due to this very reason, there is a very limited amount of published literature, or any general research conducted on this electrification period in the academic environment. Furthermore, an in-depth study of BMW as a singular firm during this transformation period presents an opportunity for a direct case study that has never been researched in this sector in

its entirety. Thus, this study will aim to fill this highly relevant gap in the literature, assessing BMW's performance and value change over time as they progressively alter their product offerings in this complex new market environment. The insights gained from the study will help extrapolate and answer how a mature and specialized manufacturer is able to perform during a strategic decision that has both a high level of controversy and cost. The implications derived from looking at vehicle announcements and launches may further be relevant and applicable to similar firms undergoing equally significant strategic transformations. The results will provide clarity into whether BMW will be able to maintain their history of prolonged success, and what possible implications these disruptive industry events have on existing market players.

1.3 BMW's background and history

Bayerische Motoren Werke, commonly abbreviated to BMW was founded 1916, in Munich, Germany. Originally, BMW was a manufacturer of aircraft engines used in World War 1 fighter planes which later in the 1920s expanded to include manufacturing of motorcycles (Howe, 2023). In the late 1920s, BMW created its first ever automobile the "3/15 PS DA2", a sporty 2-seater car which quickly entered and emerged victorious in motor sporting events. The vehicle became a huge success both in sport and public attraction, which quickly set the course of BMW's future strategies and success (Howe, 2023). BMW's early growth was however short-lived, as it was dismantled during severe bombings on their manufacturing factories and plants in Germany during World War 2, causing sharp declines in sales, production, and steep financial debt. Drastic measures were employed by BMW to ensure survival, causing a major restructuring of the company, which allowed BMW to rebound in the 1960s by introducing their first ever premium vehicle the model "507", which would establish BMW's brand as a future premium and luxury (Howe, 2023).

Thanks to the post-war economic booms and sharp growth in consumer demand for automobiles, BMW experienced swift growth between the 1960s to 2010s as they pursued a strategy of actively engaging and competing in numerous motorsport series (Howe, 2023). BMW underwent a flurry of success in the Touring World Championship entering their iconic "M3 3.0 CSL" racecar, an icon that even today resembles domination and victory (*BMW-M*, 2024). The creation of the M3 3.0 CSL would introduce one of BMW's most notorious product offerings, the "M3" series which would quickly become the poster-boy of BMW's sports car (M) division. Furthermore, BMW entered in the 1980s to 2000s as an engine manufacturer for Formula 1, the most prestigious and competitive racing series in the world. Their entry resulted in historic innovations to the field of engineering in combustion engines, for example through the creation of the first turbo powered engine to emerge victorious in the world championship in 1983 (*BMW F1 Teams*, 2018). This success with innovation and prestige would not be wasted, as BMW progressively introduced the aspects of their motor sporting technology into their road vehicle offerings.

BMW's history with motor sport success and premium vehicle manufacturing is widely recognizable in their recent vehicle offerings. At the time of this thesis, BMW offers 15 unique vehicle platforms which are powered by an internal combustion engine, and 6 unique platforms which are battery powered (*BMW Models,* 2024). Within these unique platforms there are 28 M-version model variants which represent a spectrum of slight sportiness in vehicle handling and appearance such as the X3 M, to near race-car level vehicle specifications and performance like the M5 CS (*BMW Models,* 2024). Besides just their product offerings, BMW is highly successful as presented by their sales figures in 2023 which rose 7% to 2,253,835 vehicles (Hood, 2024). This success can be attributed to BMW's rapid growth of electric vehicle offerings of which 330,956 were sold in 2023 (Hood, 2024).

However, while BMW has experienced enourmous success in sales and growth the past years, their transition to battery electric vehicles has not been without controversy. Specifically, recent design philosophies of new electric vehicles have dramatically shifted in comparison to their combustion engine counterparts. The primary motivator for design changes is the trade-off between appearance and efficiency. Electric vehicles have a limited distance they can drive until the battery depletes, and as it currently stands, this 'range' is confirmably lower than the range of their ICE counterparts and so efficiency has become a key concern for electric vehicles. To maximize this range, manufacturers prioritize aerodynamic efficiency to reduce air resistance and drag, however, this results in major design changes which may completely alter the original characteristics of the vehicle. This effect has been most notably seen in the newest vehicles of BMW, as the change in design has left consumers and fans disappointed (Macarol, 2023). Such controversies can play a major role in the performance of the company in the long-term as radical 'change' can easily backfire from the perspective of consumer demand and public attraction for the products.

Currently, BMW have released 6 electric vehicles in the past 4 years, which are to be examined in this study. The BMW iX1, iX2, iX3, iX, i5 and i7 (*BMW Models, 2024)*. Each model serve a unique purpose in the market for electric vehicles. Whether it be to provide family-friendly practicality, luxury, or performance-driven characteristics, all models should have a notable impact on the performance and value of BMW as they progressively replace the current internal combustion engine powered variants.

1.4 Central research question

To what extent is BMW's performance and value being affected by new electric vehicle releases?

1.5 Chapter breakdown

The following chapters will breakdown this study into its necessary theory, methodology and quantitative analysis sections. Chapter 2 entails the literature study, describing and discussing both the theory and practicalities behind event studies and how they are able to contribute to this specific thesis, also including a detailed statement of each hypothesis to be explored. Chapter 3 entails the methodology section, a highly detailed section to produce a comprehensive breakdown of what and how an event study works from a mathematics and practicality perspective, as well as a clear layout of all specifications of the models used which provide the readers with the opportunity for replicability. Chapter 4 entails the primary results and the discussion of the insights gained from them to help answer the respective hypotheses, as well as the inclusion of the robustness check sub-section to test the validity of the results. Finally, Chapter 5 entails the conclusion and discussion surrounding this thesis, alongside a recommendation for future research.

Chapter 2: Literature Study

2.1 Theory

Stock price:

The first step before formulating any hypotheses and predictions, is to select the correct variables to utilize in the statistical tests. The relevant metric for this thesis will be to study the stock price and stock returns. Sukesti et al. (2021) defines the impact and relevance of stock prices as a measurement of firm performance, and also value. Namely, the authors claim that the stock price of any listed firm, is a relative and proportional measure of the firm's actual total value. Sukesti et al. (2021) further extends on this by explaining the mechanism that a firm's performance directly impacts its inherent value, which is directly impacting stock prices. High stock prices reflect the underlying value of the firm, which is a source of information that attracts investors' attention and trust. Furthermore, Sukesti et al. (2021) explains that stock prices are "influenced by fundamental and technical factors," such as production side factors like earnings, manufacturing capacity and efficiency, as well as financial side factors such as investor expectation and sentiments and geographic economic circumstances. As a result, any analysis which utilizes stock price as its unit of measurement will be able to capture both firm specific performance metrics and value-specific characteristics.

In relation to this, Selvam et al. (2016) attempts to clearly define each mechanism of firm performance. Within its analysis, the authors create a list of variables under *Table 1* which impact firm performance through unique mechanisms. Under "Market Value Performance", changes in stock price is found as an important determinant for this definition. Selvam et al. (2016) claims that market value performance is an important mechanism within firm performance because it highlights the "external assessment and expectation of future performance" of a specific firm. Moreover, the inclusion of stock price is necessary to capture investor attitudes and predictions of the future value and performance of the firm, which is in

direct correlation to the claims found by Sukesit et al. (2021). This thesis will incorporate these mechanisms to measure the long-term change in the performance and value of BMW, by estimating tests that use stock price and stock price returns as its primary explanatory variable.

Product announcements and market launch:

The first topic that will be explored is the relationship between product announcements and stock price reactions. Chaney et al. (1992) explores this very relationship in their study by first highlighting the limitations of previous studies which have attempted to also research this topic. Namely, Chaney et al. (1992) finds in their literature study that previous research have found either no, or minimal positive effects of product announcements on stock prices. However, these previous studies suffered from large limitations, being the usage of monthly stock price data which is inaccurate and creates too large of an estimation window, and secondly inconsistencies in the selection of the events where multiple sources were used which results in the announcement dates occasionally not aligning perfectly. Chaney et al. (1992) account for these limitations and complete a methodology similar to an event study in their first hypothesis to estimate the effect of product announcements of 798 unique firms on stock prices. Their results show that the overall average t-statistic is statistically significant and positive at the 5% level, indicating that the product announcements infact do have a considerable effect on stock prices in a given event window. Furthermore, Chaney et al. (1992) highlight that while the average effect is significant, observing the yearly effect shows that the mid 1970s and mid 1980s differ considerably in the number of significant results suggesting that the magnitude of the effect of product announcements vary with time.

Similarly, Mann et al. (2017) presents a full event study methodology to inspect this relationship to determine both whether the effect of product announcements exists in the same manner as previously discussed, and whether there exists information leaks which would be

observable by spiking stock prices prior to the actual event. Mann et al. (2017) examines 383 new product announcements from 2003 to 2013 by firms listed in the Indian BSE 500 index. The authors observe in their results that even when alternating the event estimation windows, the effect of new product announcements on stock prices is statistically significant and positive. Furthermore, the authors show that on average the abnormal returns reactions to product announcements are positive prior to the event date and turn negative after the event date which suggests there is a case of information leakage.

Alternatively, Hao et al. (2017) examines this relationship but with a key difference being the inclusion of investor sentiment as an explanatory mechanism. Namely, the authors argue that in the event of a product announcement the effect on the stock prices and abnormal returns will be largely driven by the investor sentiment. Hao et al. (2017) first estimates the relationship between stock price reactions and product announcements by completing an event study methodology with the frequently seen market model. The results indicate the exact results as previously discussed, that there is a positive and significant effect of product announcements on stock prices. However, Hao et al. (2017) takes an additional step in their second hypothesis which examines investor sentiment as a possible factor by which stock price reactions behave. The results indicate that while there is no significant effect, the relationship between investor sentiment and average returns is positive, thus in the event of a product announcement, the effect of the stock price reaction is greater when investor sentiments are higher.

On the other hand, these previous studies have explored the impact of product announcements or reveals, whereas the paper written by Lee et al. (2009) focuses on the actual launch of the product when it becomes available to the market for purchase. Lee et al. (2009) completes an event study methodology with a greater focus on the impact of R&D and firm size as mechanisms by which shareholder value is impacted during the release of a product. Their results indicate the same pattern as seen in the announcement events, where the market

release of a new product results in a positive and significant effect on shareholder value (abnormal stock return). In addition to this research, Srinivasan et al. (2009) explores in detail the impact of product innovation and the resulting impact on abnormal stock return. Srinivasan et al. (2009) in its research describes innovation within the automotive industry where new vehicle launches can be categorized by their capacity to innovation, whether they are new to the brand or new to the entire market. This is a key insight as in the automotive industry, innovation within firms may not be as significant as innovation within the entire market which can result in varying effects on abnormal stock returns. Srinivasan et al. (2009) in its results finds that new vehicles that are innovating in the market as a whole have a significant and positive effect on stock returns, whereas the new vehicles that are only innovative within the brand receive positive but insignificant main effects on stock returns. These differences can be commonly identifiable when a new vehicle is introduced on a new platform or base-line.

These previous studies clearly indicate that there is an observable effect between product announcements, product launches and stock price reactions. Thus, this thesis will apply these previous insights with a specific focus into the electric automotive sector to generate the hypotheses. This research will build upon existing literature and take a new approach by solely focusing on BMW as a singular firm, rather than studying an array of firms derived from certain index funds. Moreover, this research will utilize both the literature from product announcements, and product launches which is commonly a segmented topic and never jointly tested. Therefore, the first and second hypothesis to be tested in this thesis are:

H1: The official announcements of new electric vehicles positively impact BMW's stock price returns.

H2: The official market releases of new electric vehicles positively impact BMW's stock price returns.

2.2 Empirical method

Armitage (1995) describes the estimation techniques commonly used when studying abnormal returns and financial performance. To study how unexpected or significant events impact the returns of a portfolio of securities, an "Event Study" is used. Armitage (1995) highlights the most common type of event study used as the ordinary least square (OLS) regression and the relationship between this regression and expected returns. This method is known as the *market model.* This technique was employed in one of the most influential event studies to date, by Fama et al. (1969) where the authors examined the increase of abnormal returns surrounding the event of a stock split. Furthermore, Armitage (1995) explains that unlike the previous model, the development and implementation of the CAPM model as an alternative can have advantages as it is backed by theory derived from a set of real assumptions. This model forecasts abnormal returns and then compares them with actual abnormal returns, commonly known as the Fama-MacBeth model.

In addition to the models described by Armitage (1995), MacKinlay (1997) dive deeper into the details and strengths of an event study in a financial performance analysis. MacKinley (1997) argues that the primary strength is derived from the nature of how financial securities act. Namely, in the scenario of any unexpected events such a stock split, the effects of the event will be ultimately reflected in the security prices almost immediately. The nature of this pattern in combination with the respective event study techniques creates immense opportunities to study both individual firm and grouped portfolio performance in response to certain events. There exist however certain limitations of event studies such as the homogeneous effect assumption which states that any effect on an event will be homogenous across all affected assets, or the assumption of efficient markets which states all information and knowledge is quickly and accurately depicted in stock prices. It can occur that specific events, dependent on the portfolio and financial environment may experience large reaction delays due to misleading

headlines or obscure flow of information from official sources. Furthermore, any other limitation on the data side such as sufficient sample size and accurate boundary and event window selection may become a disadvantage for this methodology if not accounted for (MacKinley, 1997).

These specifications and fine details are strictly defined in the paper written by Pacicco et al. (2018) where an event study methodology is applied using the "estudy" command in the statistical software STATA. This community contributed command is able to run an event study by computing "average returns (ARs), average abnormal returns (AARs), cumulative abnormal returns (CARs), and cumulative average abnormal returns (CAARs)" (Pacicco et al, 2018). The authors breakdown each individual specification that is able to be defined, specifically in that the command is able to have a customizable event window and boundary range. Customizing the event window is important to estimate whether the abnormal returns observed at the time of the event is attributable to a certain period that was used as reference, and the inclusion of customizable event date boundaries allows the test to include anticipation or information leaks prior to the event, or lagged financial reactions or information delays past the event date (Paciacco et al, 2018).

This thesis will aim to incorporate these insights, from a theoretical perspective; why is an event study the best methodology to study the financial performance of BMW over time with new vehicle releases, and also from an application standpoint; by using the 'estudy' command with set variations to test each hypothesis. Furthermore, the application of this thesis will add onto the existing literature by including an event study methodology in a fresh field with limited previous research and the usage of the 'estudy' command will add into the usage of the command which can be assessed by future academics to see whether it was an appropriate and relevant analysis which may motivate or inspire the extension of the topic or the creation of brand new fields in the research.

Chapter 3: Research Methodology

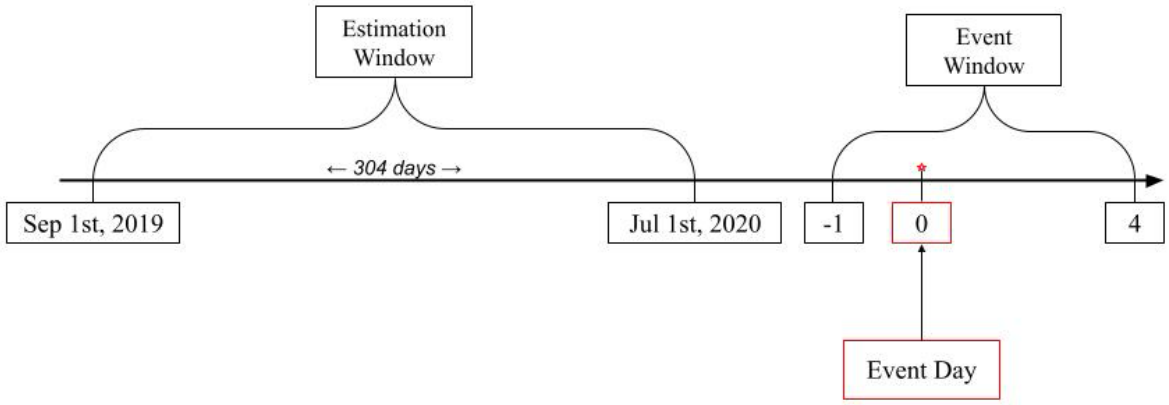

Figure 1: Event study specifications and windows diagram

3.1 Conceptual framework

The event study methodology is a widely recognized estimation technique used primarily in financial and economics-related analyses. The method examines the impact of specific events on the value or performance of a firm, most commonly using stock prices or stock price returns as an instrument (*Event Study*, 2024). This thesis will incorporate this method, by using the STATA statistical tool for the analysis, and using the community-created 'estudy' command as described in the paper Pacicco et al. (2018). The primary assumption of this estimation technique is that any significant and newly available information which has an impact on firm value will be swiftly and accurately reflected in the reaction of the stock price of the firm. Therefore, examining the reaction of stock prices surrounding a specific event date will enable the authors of the test the statistical significance of the event on firm value (*Research Guides: Event Study with Stata*, 2023).

The primary assumption that stock price reactions swiftly and accurately reflect the impact of specific events is called the efficient market hypothesis, otherwise known as the EMH assumption. The EMH assumption can be divided into 3 separate forms depending on its relative strength (*Semi-Strong Form Efficiency*, 2024):

1. **Strong form efficiency:** All information, both public and private, are perfectly and instantly reflected in stock price movements.
2. **Semi-strong form efficiency:** All information publicly available, are already reflected in stock price movements.
3. **Weak form efficiency:** All past information are reflected in stock price movements.

For the duration of this study, the semi-strong form is assumed to hold. This implies that the impact of BMW's electric vehicle announcements and market launches are accurately and quickly reflected in their stock price, however, there is a high possibility that there will be a brief delayed reaction after the event or an anticipatory reaction observed prior to the event as a result of imperfect flow of information, which is the fundamental reason for denying the use of the strong-form as it requires highly restrictive conditions.

3.2 Data collection

To appropriately complete an event study methodology, the first requirement is obtaining a coherent and consistent dataset which the estimation test will utilize. This dataset contains: the primary estimation variables (stock price of BMW and European market index) and the exact dates of each event explored (electric car announcements and market launch dates). The historical stock price data of BMW and the European market index was obtained from Yahoo Finance (2024). Yahoo Finance (2024) is an online database containing a wide array of freely available financial and investment-related information, including the ability to search and download historic stock prices. From this database, the daily closing price of the BMW.DE stock was obtained from 1st of January 2018 until 1st of June 2024. The start-date of 2018 was chosen to leave sufficient room for testing various methodologies for the earliest announcement

date which was in July 2020. The range ends in 1st of June 2024 which was the last possible day for data collection by the author for this thesis.

Furthermore, the historical data for this exact range was obtained for the stock: STOXX 600 Europe, which is a stock index containing a diverse range of 600 European capitalization companies of large, middle and small sizes. This index covers roughly 90% of the "free-float market capitalization" of European stocks including BMW, which presents it as an appropriate tool to include as a market index for the event study methodology to account for the systematic risk component of returns (*Europe 600 (SXXP),* 2024). This European stock index was chosen to represent the European market, which BMW as a European company is likewise participating in, enabling the event methodology to accurately compare the market performance of Europe versus the performance of BMW. Ultimately, the obtained stock price data was aggregated into a single excel spreadsheet, where daily stock price returns for both BMW and STOXX600 were calculated. It is important to note, the dates of each daily stock price returns must be consistent between the two stocks, which was not the case originally in the dataset. These inconsistencies (combined 9 total) existed as the STOXX600 security was on occasion closed on certain dates where BMW was not, creating gaps in the total number of entries. This issue was simply fixed using Excel's VLOOKUP and MATCH commands.

The second factor to complete an event methodology is having a comprehensive and accurate list of dates for each event to be estimated. For BMW the comprehensive overview of each date can be seen in Table 2. To ensure that each date for announcements or market launches are truly precise and consistent with the real events, only the official press releases from BMW were used. These press releases can be found on BMW's official website under announcements and are the first place that any reveal or vehicle release information is shared publicly. Every single date was collected from this press page, ensuring that the dates come from a singular, trustworthy source. Commonly the vehicle announcement post would contain

both the announcement date and the market release (in Europe) for the vehicle, however, occasionally the market launch date was not necessarily revealed. Therefore, a more recent press announcement on the vehicle model would be used to determine when the vehicles would be launched to the market. A comprehensive overview of the descriptive statistics of the dataset can be found in Table 1 below.

Table 1: Descriptive statistics

Variable	BMW Stock return	STOXX600 Stock return
Observations	1610	1593
Mean	0.028%	0.023%
Median	0.021%	0.085%
Std. Dev.	1.824%	1.052%
Min.	-12.971%	-11.478%
Max.	14.472%	8.405%
Skewness	-0.183	-1.061
Kurtosis	10.729	17.484

3.3 Model creation and specification

Event identification (1)

The first step in using this method is to search for relevant and significant events. These events should be relevant in the sense that they directly impact the firm or portfolio which the study targets and they must have a reasonably significant impact on the firm or portfolio's stock price movements and reactions. Common examples of such events are: stock splits, mergers and acquisitions, earnings reports, new product announcements, new product innovations, newly

imposed policies, and macroeconomic related factors. This thesis focuses on the impact of product-related events. A full list of each identified event can be found in Table 2.

Table 2: Event identification

Model	Announcement	Market Launch
iX3	14.07.2020	01.09.2021
iX	02.06.2021	01.11.2021
i7	20.04.2022	01.07.2022
iX1	01.06.2022	01.11.2022
i5	01.05.2023	21.10.2023
iX2	11.10.2023	01.03.2024

Event window specification (2)

The second step is to define the estimation window surrounding the chosen event. This decision is highly subjective and dependent on both the topic of the study, as well as the EMH assumption strength. For this thesis, the semi-strong form is used which implies that there might exist delays or anticipation of the event. Furthermore, product announcement information is not always instantly received by the public. Therefore, the event window cannot reliably be set to [0,0] which would restrict the window to only the actual day of the event. For the purposes of this study, the event window [-1, 4] was chosen, meaning that the event interval used in the estimation will be 1 day prior, and 4 days after the event date. The window starts 1 day prior to the event date in order to capture any anticipatory reaction from private knowledge, or any possibilities of information leakage as described by Mann et al. (2017). The event window ends 4 days after the event date, which is a considerable amount of time given in order to capture the possible delayed investor reaction, which is motivated by the claims of MacKinlay (1997).

Estimation window specification (3)

The third step is defining the estimation window interval which will determine what historical data the event study will compare the returns to on the days of the event window. Similarly to the choice of the event interval, estimation windows are subjective, and study related. For the purposes of this thesis, the estimation interval of 304 days between September 1st, 2019, and July 1st, 2020, was chosen. This event interval was chosen to contain a sufficient number of days to be used in the estimation period, as well as having a window that is equally recent, but does not contain any of the events being studied. Since the first event in this study takes place on the 14th of July 2020, this window meets both the required criteria.

Model choice (4)

The fourth step in this process is to determine which model specification is most appropriate to use. The 'estudy' command in STATA offers 4 model choices, each use a different approach to calculate abnormal returns or cumulative abnormal returns. These returns are the primary measure by which statistical significance is derived from:

1. SIM: *Single Index Model*
2. MAM: *Marked Adjusted Model*
3. MFM: *Multi-factor Model*
4. HMM: *Historical Mean Model*

From these choices, this study will implement the Single Index Model (SIM) specification. The SIM model calculates abnormal returns by observing the daily returns of BMW over the estimation window and regresses them against the returns of the market index. This is completed by calculating the actual returns, versus the expected returns based on the

relationship with the specified market index, in this case STOXX600. For a larger event window like in this study, these abnormal returns are further calculated to estimate the cumulative abnormal returns to observe the total effect during the event window instead of only the event day. Furthermore, the Historical Mean Model (HMM) will be estimated to use as a robustness check after the completion of the primary results. The reason behind using the SIM model instead of the MAM and MFM model is because firstly the MAM model is over simplistic as it does not estimate a regression between factors, but instead subtracts the real returns from the expected returns as it's analysis. Furthermore, the MAM model is generally less accurate as it does not account for the specific relationship between BMW and the market index and uses an assumption that the stock of BMW moves exactly like the market which is a restrictive and likely untrue assumption. On the other hand, the MFM model uses several quantifiable factors to measure price movements, making it more complex than the other models, which in return also makes it considerably more difficult to complete. The primary limitation here is the lack of public data available on includable factors from BMW, mainly due to secrecy and the limited availability of trustworthy and relevant data regarding possible factors.

3.4 Mathematical derivations and definitions

While this study uses the community created STATA command 'estudy' which internalizes all calculations, it is still important to clearly define each variable measured and calculated in the process of running an event study test. For this, all relevant equations which are internalized in the statistical software according to the model specifications previously discussed are defined and derived from Pacicco et al. (2018) and *Event Study - AR and CAR Test Statistics* (2023) below:

Step 1: Stock returns and market returns

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

$$R_{m,t} = \frac{P_{m,t} - P_{m,t-1}}{P_{m,t-1}}$$

Step 2: Regression model and parameter estimation

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}$$

where α and β are defined as:

$$\alpha_i = \bar{R}_i - \beta_i \bar{R}_m$$

$$\beta_i = \frac{\sum_{t=T_{-304}}^{T_{-1}} (R_{m,t} - \bar{R}_m)(R_{i,t} - \bar{R}_{i)}}{\sum_{t=T_{-304}}^{T_{-1}} (R_{m,t} - \bar{R}_m)^2}$$

and where T_{-304} and T_{-1} represent the interval of the estimation window period.

Step 3: Expected returns and abnormal returns

$$\hat{R}_{i,t} = \alpha_i + \beta_i R_{m,t}$$

$$AR_{i,t} = R_{i,t} - \hat{R}_{i,t}$$

Step 4: Cumulative Abnormal returns

$$CAR_{i,t} = \sum_{t=T_{-1}}^{T_{+4}} AR_{i,t}$$

Step 5: Standard deviation of abnormal and cumulative abnormal returns

$$\sigma_{AR_i} = \sqrt{\frac{1}{N-2} \sum_{t=T_{-304}}^{T_{-1}} (AR_{i,t} - \bar{A}R_i)^2}$$

$$\sigma_{CAR_i} = \sigma_{AR_i}\sqrt{T_{+4} - T_{-1} + 1}$$

Step 6: Test statistic

$$t = \frac{CAR_i}{\sigma_{CAR_i}}$$

These equations define the step-by-step actions and calculations taken using Excel and later internally in STATA using the 'estudy' command. The formulas and equations are optimized for the specifications of this study, including the event and estimation windows and model type. The steps provide a guide for replicability and proof of transparency in the process of estimating the primary results of this study.

3.5 Limitations

1. Market assumption and stock price data

The primary assumption employed in this study is that the stock prices accurately and relatively quickly reflect all publicly available information, therefore any stock price movement can be measured as the true effect of a given event taking into account all contributing factors. However, it can occur that external financial or macroeconomic factors are not directly represented in the stock prices. Alternative variables such as R&D intensity, supply chain capabilities or competition may not be perfectly captured in the reactions of the stock price. Furthermore, neutralization of stock movements attributable to balanced investor sentiments may further cause difficulties in the estimation. In example, theoretically when investor reactions are perfectly symmetrical where half find an event positive and half find it negative, the purchases and sales of stocks will perfectly balance out, resulting in no observable stock price movement. Therefore, even if a significant investor reaction took place, the stock prices

may simply reflect no change. Furthermore, daily stock prices may not fully capture ‘day trading’ investor characteristics as a result of holidays and non-trading days which create a few missing observations in the dataset.

2. Conjoined vehicle announcements and market launches

A limitation of estimating the vehicle announcements and market launches of the BMW models is that certain models such as the iX1, iX2 and iX3 are announced together with their hybrid and even occasionally gasoline powered counterparts. The reason being that these vehicles are cheaper, entry level models that most likely aren’t worth the trouble of conducting separate announcements or market launches for, so they are combined for simplicity or cost-reducing purposes. For this reason, however, the validity of the results for these vehicles are reduced as the events estimated are not unique to the model being evaluated, and investor reactions may be misrepresented as a result of this.

3. Event window and generalizability

The event window chosen for this study may not entirely capture the effect of the event itself between all chosen events. For instance, the announcement of a vehicle which is highly anticipated and received specialized marketing prior to their announcement or launch may strike a more sudden reaction fitted to the specified window, whereas the sudden and unexpected announcement of a lower model may induce a slower, more gradual response which may not be captured within the event window. Therefore, in combination with the previous limitations the generalizability of the findings are low, as they are highly specific to BMW and highly dependent on the factors listed in the event study. Extrapolating these findings to other manufacturers or firms may prove to be inefficient.

Chapter 4: Results

Table 3: Table of event study results of BMW's announcements and market launches

VARIABLES	(1) Announcement	(2) Market Launch
BMW iX3	-2.116% [0.554]	2.035% [0.415]
BMW iX	8.477%*** [0.001]	3.466% [0.190]
BMW iX1	2.622% [0.271]	0.198% [0.937]
BMW i7	5.149%* [0.063]	0.290% [0.910]
BMW i5	7.715%*** [0.003]	-5.723%** [0.016]
BMW iX2	2.768% [0.285]	-3.370% [0.198]
Event window	[-1, 4]	[-1, 4]
Estimation window	[304 days]	[304 days]
Model specification	SIM	SIM

*** p<0.01, ** p<0.05, * p<0.1

4.1 Announcement event results

The results seen in Table 3 show the cumulative abnormal stock return during the event windows. Observing the first model which assesses the impact of BMW's official announcements of new electric vehicles, 3 of the announcements receive a statistically significant value, while the other 3 do not.

First, the analysis of the BMW iX announcement using an event window of 1 day prior, and 4 days after the event, holding all else constant, yielded 8.477% in cumulative abnormal returns (CAR %) from BMW's stock. This is statistically significant at the 1% level with a p-

value of 0.001. This result indicates that upon BMW's announcement of the model iX, there was a substantial positive reaction from investors, which can be seen in Figure 2 as the CAR (%) drastically rises during the event window.

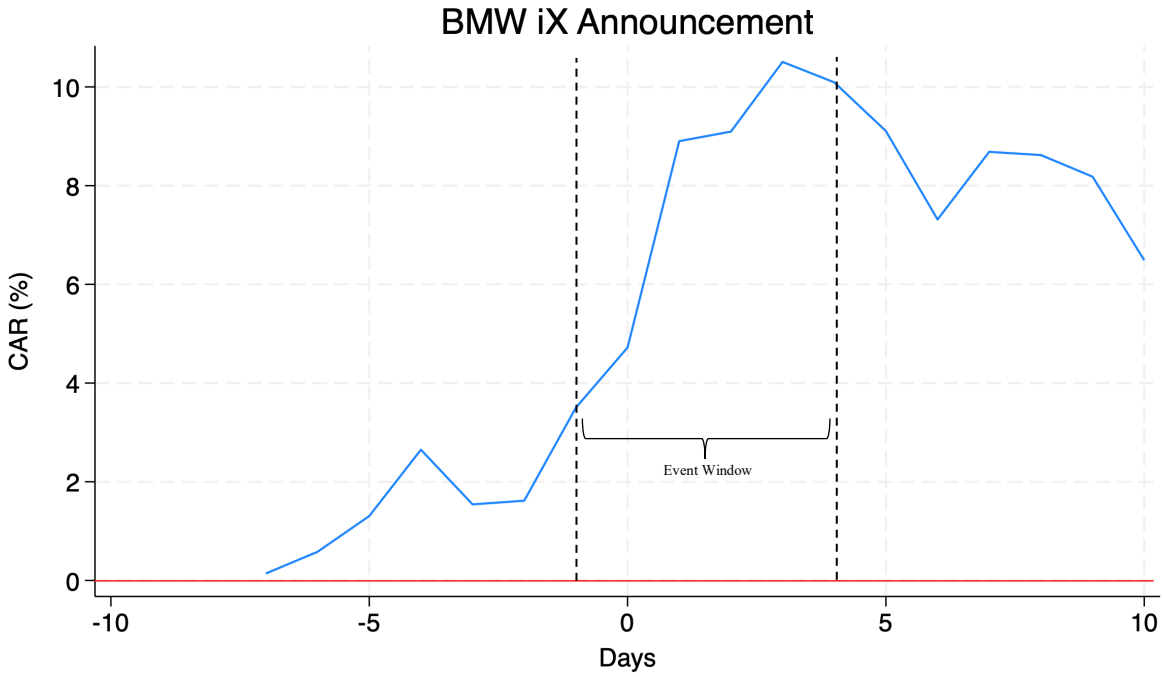

Figure 2: CAR% of BMW during iX announcement

Furthermore, the graph displays a consistent reaction from the market as the CARs were initially low, hovering around 2% and after the event window the CARs remained on average at the 7.5% level before falling on the 10th day. This result further indicates that there was a strong and positive investor sentiment towards this specific electric model that was sustainable both over the event period as well as shortly afterwards, and ultimately had a positive impact on the performance and value of BMW.

The BMW i7 is the second significant result from Table 3. The announcement of the model i7 yielded 5.149% in cumulative abnormal returns (CAR %) from BMW's stock. This is statistically significant at the 10% level with a p-value of 0.063.

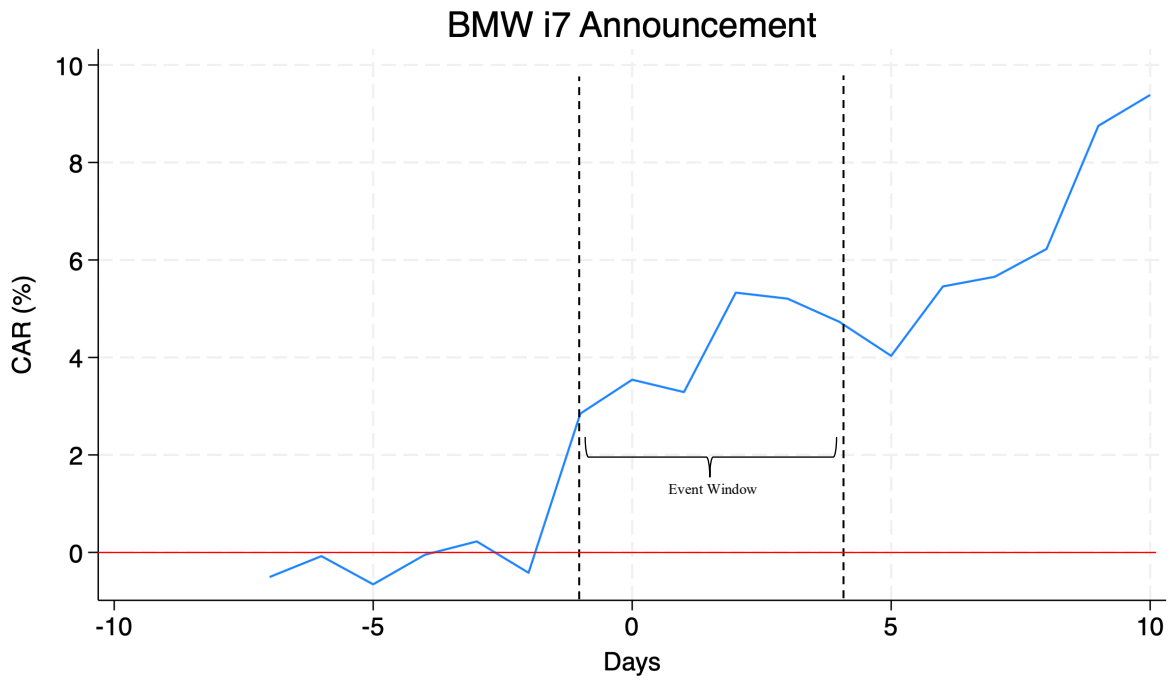

Figure 3: CAR% of BMW during i7 announcement

Observing Figure 3, a notably different pattern can be seen. Prior to the announcement, the CAR (%) was hovering around 0%, and 1 day before the event this percentage sharply increased to 3.5% and during the event window peaked at 5%. Interestingly, unlike the model iX, BMW's CAR (%) kept rising after the announcement even reaching levels up to 9.5% instead of falling off after the event window. Thus, the announcement of the i7 indeed proved to be backed by strong positive investor sentiments.

A similar pattern to the iX can be observed regarding the announcement of the BMW i5 model. The official announcement of the BMW i5 yielded 7.715% in cumulative abnormal returns (CAR %) from BMW's stock. This effect is statistically significant at the 1% level with a p-value of 0.003. This further supports the strong and positive market reaction to new electric vehicles from BMW, however dissimilarly to the release of the i7, the CAR (%) of BMW stock sharply fell directly after the event window as can be seen in Figure 4.

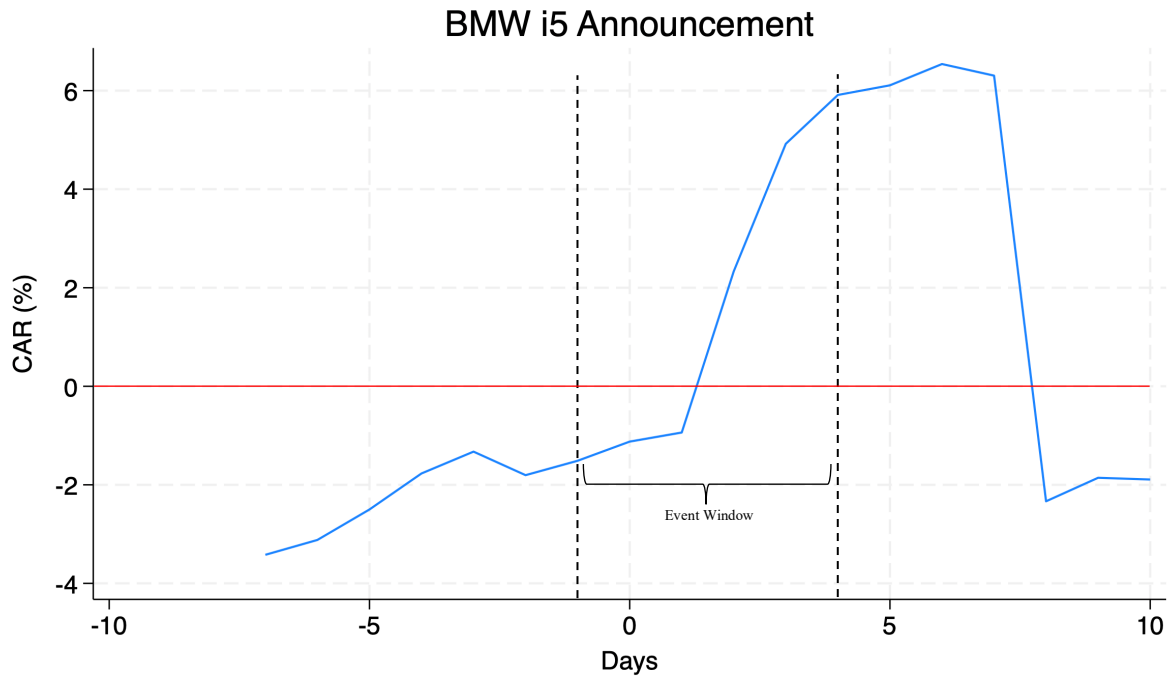

Figure 4: CAR% of BMW during i5 announcement

Prior to the announcement, BMW was roughly averaging -2% CARs, while during the event window the CAR (%) rapidly increased day by day and eventually peaked at 6% on the last day of the event window. Later however, on the 8th day after the announcement of the i5, BMW's CAR (%) dropped from 6% to -2%. This trajectory indicates that while the announcement of the i5 was very positive, this reaction was short-lived and not as consistent as what was observed with the announcement of the iX or i7.

Reviewing the rest of the announcement results from Table 3, none of the other model announcements yielded significant results. This is further supported by looking at the respective CAR (%) graphs of each model which can be found in the Appendix 1 and 2. These CAR (%) graphs show either minimal, or no change in the level of the CARs during the event windows. Therefore, it is crucial to discuss why certain models like the iX, i5 and i7 had such a positive and significant reaction, whereas the other models; iX3, iX1, and iX2 did not.

Looking into the significance of the BMW iX, the most likely reason for its hugely positive response was due to the fact it was a brand-new electric platform offering both luxury and flagship technology according to BMW's iX press release (2022). This would support Srinivasan et al. (2009) which claimed that significant innovation is the catalyst for a successful product announcement or launch. Namely, the model iX showcased BMW's future trajectory in electric mobility, luxury and comfort design and finally their new battery technologies. Since the launch this model has become the flagship of electric SUVs for BMW even outshining any competitor. Namely, features which are included in the iX such as its dynamic charging technology, its "self-healing intelligent surfaces" and extensive performance and efficiency driving capabilities are what set this vehicle apart from anything that BMW or any of its competition currently offer. Furthermore, the iX is a luxury SUV vehicle which is positioned to cater towards the growing demand for luxury electric vehicles and overall growing preference for larger vehicle variants. Thus, the large significant effect the announcement this vehicle had can likely be contributed to the fact that this vehicle is a flagship in its technologies and capabilities and was highly anticipated as it was released on a newly developed platform which confirms BMW's future commitment in electric mobility.

The i7 on the other hand presents a less straight forward answer. On the release of the i7, consumers and investors faced a difficult dilemma as the car in question seemed to shine in terms of technology and luxury capabilities closely to that of the iX. These characteristics define the 7 series BMW which is positioned to be a large, luxurious vehicle that places comfort and seamlessness above all else. However, according to Williams (2022), these fundamentals were partially out shadowed by BMW's highly controversial design choices. The BMW i7 was amongst the first few electric models from BMW which received heavy backlash for their seemingly absurd and unflattering design choices. As expected, consumers will always heavily judge the exterior styling of a vehicle since it is the feature which is seen the most in a day-to-

day basis. For this reason, the significant value found was only at the 10% level in this event study. This could be the result of a mixed reaction from the market, where the positive and negative investor reactions towards the vehicle seem to partially cancel each other out in the stock price movements, resulting in a (lower) but still significant value.

The i5 experienced a similar story to that of the model iX during its announcement, but slightly different factors can be attributed to its success. The model i5 received immense anticipation regarding its performance expectations and also received tailored promotion campaigns from BMW prior to its announcement. The i5 electric model was likewise built on a brand-new platform that was inspired by its original combustion engine 5 series version. This series is undoubtably one of BMW's most successful and beloved model series, positioned as a luxury and sporty sedan (Auto Express, 2024). The BMW 5 series, similarly to the 3 series, is widely recognized as one of the best sports sedans offered in the industry. Not only does it offer plenty of practicality from the side of storage capacity and driving assist technologies, but it has the performance capabilities that no competition has been able to rival as of recent (Auto Express, 2024). These characteristics created a high level of anticipation for its electric version, with fans, consumers, and investors alike, expecting the reputation of this model to continue. Similarly to the iX, the i5 ventured further into the growing luxury segment with the inclusion of sustainable 'vegan' interiors, eDrive comfort technology and optional crystalline material design choices (*The New BMW 5 Series Sedan*, 2023). Furthermore, the switch from a combustion engine to battery electric powertrain presented an opportunity for BMW to add an edge to their vehicle performance capabilities, something which consumers and investors positively reacted to as this model of BMW was expected to be a class leader above all in terms of performance. This sentiment was promoted by BMW prior to the announcement using silhouette images and careful advertisements of the i5, which likely played a role in the highly

positive reactions. These factors are likely the reason for the significant positive reaction to the announcement of the i5 in this event study.

Lastly, it is interesting to discuss the reasons why the other model announcements from BMW did not receive any significant reaction. The probable reasons why the models iX1, iX2, and iX3 did not result in any significant CARs from BMW's stock on the announcement days was because they are simply supplementary vehicles. They are cheaper and lower-class models with less exciting features compared to the other models discussed in this study. Notably, the X series lineup from BMW represents their SUV model variants, and these vehicles are relatively entry-level, cheaper and more oriented for family-use and serve only the basic functions of a modern car. This also inherently means that they will receive less attention from consumers and investors as they are more supplementary to the BMW lineup, in the sense that they create an opportunity for entry for any aspiring BMW customers. Furthermore, the press announcements for the iX models were not unique. For example, the iX3 was announced in combination with its plug-in hybrid version alongside the fully electric version which further supports the fact that these models are much less important than the iX, i5 or 17 which received their unique press release announcements. Therefore, these new electric X-models from BMW showcase that in terms of their electric transformation decision, some models just simply don't affect their performance or value in a significant way, which can be a useful insight to prove not every product release will completely shift the performance and value of the company itself.

The first hypothesis states that the BMW's official announcements of new electric vehicles have a positive impact on the performance and value of BMW. Based on the previous discussion, this hypothesis is proven to be partially true as proven by 3 positive and significant event values, but also 3 insignificant values. It would seem that in the case of BMW, specific vehicles that either offer a new innovative and fresh platform or are highly anticipated top models, receive a high level of response from the market during their official announcements,

impacting their value and performance in a significant, and positive way. However, models which are lower class and more supplementary to the lineup of products receive much less attention both from the manufacturer as seen by the use of joint announcements, and also the market as seen by the lack of significant reactions.

4.2 Market launch event results

Looking at the results for the market launch events from Table 3, it is quite striking that there is only one significant result for the i5, which is also highly negative. The other models receive no significant values from this event study. The market launch of the BMW i5 yielded -5.723% in cumulative abnormal returns (CAR %) from BMW's stock. This effect is statistically significant at the 5% level with a p-value of 0.016. This effect is further displayed in Figure 5 as seen below:

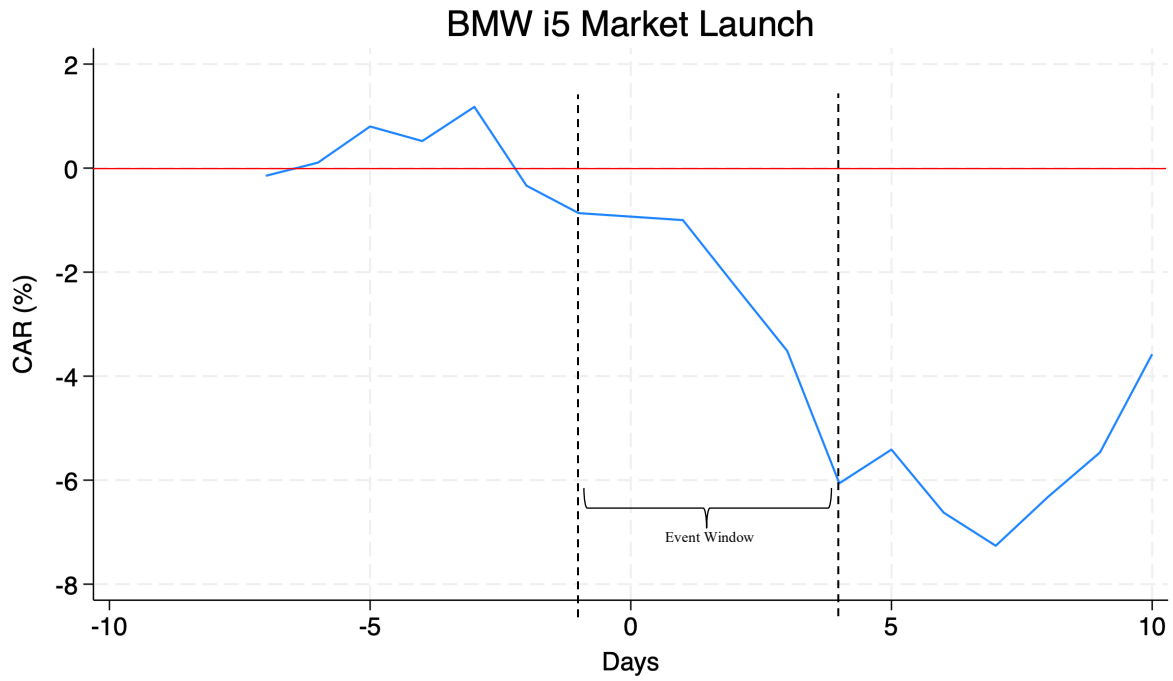

Figure 5: CAR% of BMW during i5 market launch

What can be observed from this figure is that BMW's CAR (%) was already declining prior to the market launch of the i5. This can be explained as an anticipatory reaction from the market, where the actual event day is pre-determined and already known by the market. Thus, it can occur that investors and consumers that expect the car to be unsatisfactory are preemptively selling BMW stock in order to avoid any further drop in the price once the vehicle is released. In the actual event window, a clear decrease in the CAR (%) can be observed which also extends past the event window up to 7 days after the event. While the CAR (%) actually begin increasing 1 week after the event, this reaction would be attributable more towards a "buy low opportunity" investor reaction rather than as a delayed positive reaction to the i5. A noticeable feature in the results is that the BMW i5 received a positive significant reaction upon its official announcement but received a negative significant reaction during it's market launch. An explanation for this can be quickly found when browsing the official BMW forum threads which are designed for consumers and fans of BMW's to talk about all and everything BMW related. Reading the reviews created by famous automotive journalists such as 'Car and Driver' or 'Autoexpress'. The key factor which likely contributed to the poor market launch performance of the i5 was the price. According to *ISeeCars.com* (2022), the prices of electric vehicles have increased by 54.3% from 2021 to 2022 whereas combustion engine vehicles only increased by 10.1%. This trend has followed through even today where the prices of electric vehicle seem extensively inflated. It may have occurred that because the anticipation and hype for the BMW i5 was so positive, when BMW launched the i5 to the market, the consumers and investors who were excited about the model quickly realized how absurd its prices have become. Infact, the price of the vehicle was the most commonly expressed complaint with the car where a higher performance version of the i5 with added extras could see a list price upwards of £100,000+ in the UK, which is nearly £20,000 more than its combustion engine counterpart according to the journal review: *BMW i5 Review: Electric, but at What Cost?*

(2023). If the model i5 received such a negative turnout on its launch because of the price, then it questions why the other models who were similarly effected by pricing not significant in the event study.

There are 2 reasons which can explain this pattern, firstly that there was significantly less hype and expectation and secondly is the significance of the models to the consumers. The iX1, iX2 and iX3 as previously explained are entry-level and overall, less exciting and important to BMW's lineup as opposed to the i5, i7 and iX. Therefore, if the announcement of these models were not significantly affecting the CARs of BMW, then the market launch was unlikely to be significant too. The majority of the information surrounding the announced models are already public, and therefore the expectations of the investors and consumers are already accurately depicted within the stock price prior to the market launch. The curious result is the lack of significance of the iX and i7 models which were previously significant during their announcement. An explanation for this could be that the consumers and investors simply learned everything to know about the vehicles, and the excitement for them died down as the market launch dates approached. Moreover, as the iX and i7 are still highly luxurious models, rather than a sporty sedan like the i5, thus the general hype surrounding them likely faded away with time. Lastly, the famous 3 series and 5 series lineups from BMW were commonly priced at a premium, but never at the level of luxury. This difference was crucial to consumers who were highly involved with the sporty-performance side of BMW's vehicles as they were still offering premium qualities, but at an affordable price. The model i5 seemed to have crossed this line, with its sharp price increase the negative reaction likely stems from the large group of enthusiasts who were expecting a reasonably priced sporty vehicle, and instead ended up with a considerably higher priced vehicle that also no longer contained its infamous combustion engine.

The second hypothesis states that the BMW's market launches of new electric vehicles have a positive impact on the performance and value of BMW. Based on the previous discussion, this hypothesis is proven to be false as a result of only 1 significant event result, which was negative, while the other 5 event values were insignificant. It would seem that the market launches of new electric vehicles generally have no significant impact on the performance or value of BMW, however it can occur that new vehicles which are loaded with expectations like the model i5, can indeed fail and lead to losses if those expectations are not met.

4.3 Robustness check of results

To assess whether the results found in the event study are robust and not received through chance, a robustness check is performed. Specifically, the same event study methodology is executed with one small but important change. The market model is changed from the 'Single Index Model' to the 'Historical Mean Model'. This key distinction will shift the way the methodology calculates the CARs of BMW where previously BMW's stock returns were used by regressing them against a market index, thus incorporating systematic risks and relationships between BMW and its market, whereas now BMW's historical stock returns will be compared purely against itself. Changing the type of model used in the study will test the robustness of the results as a completely different calculation is implemented, which ultimately will highlight whether there are inconsistencies or not. The table of results for the HMM model can be found below:

Table 4: Results robustness check using historical mean model (HMM)

VARIABLES	(1) Announcement	(2) Market Launch
BMW iX3	1.053% [0.864]	1.843% [0.577]
BMW iX	10.006%*** [0.002]	5.204% [0.126]
BMW iX1	3.253% [0.336]	2.077% [0.530]
BMW i7	0.688% [0.838]	0.910% [0.777]
BMW i5	8.438%*** [0.001]	-6.943%** [0.018]
BMW iX2	4.318% [0.178]	-1.627% [0.593]
Event window	[-1, 4]	[-1, 4]
Estimation window	[304 days]	[304 days]
Model specification	HMM	HMM

*** p<0.01, ** p<0.05, * p<0.1

This table of robustness checks is very similar to the official results Table 3. There is one key difference between the two results, where in the original table the announcement event of the BMW i7 was significant, has now turned insignificant. Infact the p-value of 0.838 is highly insignificant suggesting that without comparing BMW's returns to the market, and purely assessing the performance based on its historical returns, the model i7 did not play any significant role for BMW. While this is a large inconsistency between the two methods, the HMM model is simply demeaning the returns of BMW against itself without the inclusion of systematic risk or correlations of the stock to the market itself, making it less reliable. Therefore, this switch in significance is not unexpected, and can be explained simply by the simplicity of the HMM model. The rest of the significant results remained significant and with

the same sign as previously found, with only minor changes in the respective CARs and p-values. Even the insignificant values and signs remained generally consistent between the two methods. Therefore, to a large extent the main results table is verified to be robust, and the values produced are proven to not be conceived by chance.

Chapter 5: Conclusion

This study aimed to explore how recent technological transformations in the automotive industry driven by sustainability and climate-mitigating policies have shaped the performance and value of BMW, a historically successful incumbent of this industry. BMW built its success and reputation through their participation in motorsport events and the manufacturing of sporty, premium cars, all of which were powered by variations of their famous internal combustion engines. The central research question explores how a company which built its success on the ICE platform is performing during this rapid electric transformation period, a time where key strategic decisions are made which can have a considerable impact on the firm. To answer this research question, an event study is used to examine first the impact of the official announcements and second the market launches of new electric vehicles on BMW's stock price returns.

The literature study discussed the relevance of using stock price data as an appropriate measure of firm performance and value. Stock price is a unique financial metric that is able to reflect investor sentiment quickly and accurately, which presents it as a powerful tool for estimating what effect an event had on a firm, and further solidifying it as a particularly relevant variable to use in an event study. Proof of this can be seen in the literature on the event study methodology which all make use of stock price returns as their variable of interest. The literature discussed which have completed full-scale event studies all use large portfolios of companies to assess whether product launches or announcements result in significant abnormal returns. Their findings show that in comparison to market returns, every major product launch present significant abnormal returns.

This event study methodology was employed in this thesis using alternative specifications which presented a method and topic previously unexplored. Namely, this thesis explored a singular company, rather than a large portfolio of securities. There were certain

limitations to this methodology, namely that measuring stock price reactions may be inaccurate due to the balancing of stock movements where positive and negative reactions balance out. Furthermore, certain events were not completely unique where it occurred that the announcement or market launch of a certain vehicle was performed jointly with other vehicles such as a hybrid counterpart. This would have an impact on the event study results as the findings would also reflect any changes in stock returns from the other vehicles released on that same day.

The primary results from the event study partially proved the first hypothesis to be true that official announcements have a positive impact on BMW's performance and value, whereas the second hypothesis claimed that the market launches of vehicles would result in a positive effect on BMW's performance and value was thoroughly disproved. The official announcement events produced 3 significant and positive results for the models iX, i7 and i5. It is argued that the reason these 3 specific events were significant, was because they were firstly presented on a brand-new platform instead of a revitalized version of their ICE platforms. Secondly, because they received customized advertisements and teasers which would generate excitement and hype for the official preview of the models. Lastly, because they are top models with inherent expectations and hype behind them, rather than the entry-level models which are supplementary vehicles. On the other hand, only the model i5 was significant in the second event study regarding market launches, and the value was highly negative. The reasoning for why the market launch seemed to produce mainly insignificant values is because there is generally less excitement and most crucial information has already been released and thus reflected in the stock prices. Therefore, the day the vehicles become available for purchase, there is a limited amount of additional information released to provoke a reaction in the market. The model i5's result is argued to be significant and negative because the price of the vehicle was highly inflated compared to its ICE version, and the vehicle

received a tremendous amount of excitement and expectations during its announcement being one of the most famous models in the BMW lineup, which quickly turned to disappointment when the vehicle was fully released.

Thus, to answer the research question, it would seem that BMW generally seems to perform well and has grown in value with the period release of new electric vehicles. While the event study proved that most new electric vehicle releases from BMW have no considerable impact, their top of the range models which are innovative, luxurious, sporty, and have a large excitable group of followers can prove to be very effective in achieving future success and growth. Extrapolating these findings, it is concluded that successful and established firms undergoing risky strategic decisions should not be afraid of launching new products in a rapidly shifting market environment. Instead, it is an opportunity for innovation and growth, where less impactful products are not harmful to the performance or value of the firm. However, firms should tread carefully when releasing products which are popular and receive a lot of expectations as consumer and investor sentiments can quickly change when key details receive a negative reaction. A limitation of this study was that a singular firm was assessed rather than a portfolio of securities, making it difficult to provide an externally valid conclusion on firms in general, and the behavior of the industry during this transformation period. Therefore, further research should target a large-scale analysis where multiple manufacturers are studied together in an event study, similar to what previous literatures have completed using large portfolios of firms rather than a specific single firm. The insights gained from such further research would assist in evaluating to what extent BMW is especially successful or not in comparison to their competitors, and overall, how the market dynamics seem to be affected in this highly exciting period in the automotive industry.

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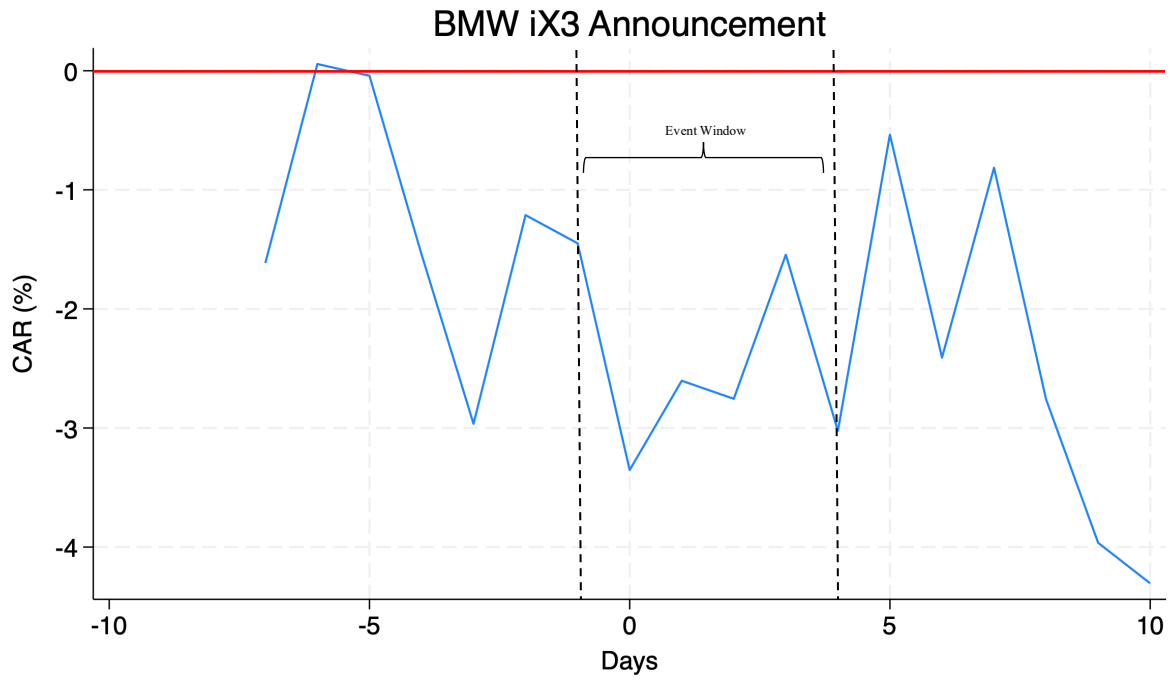
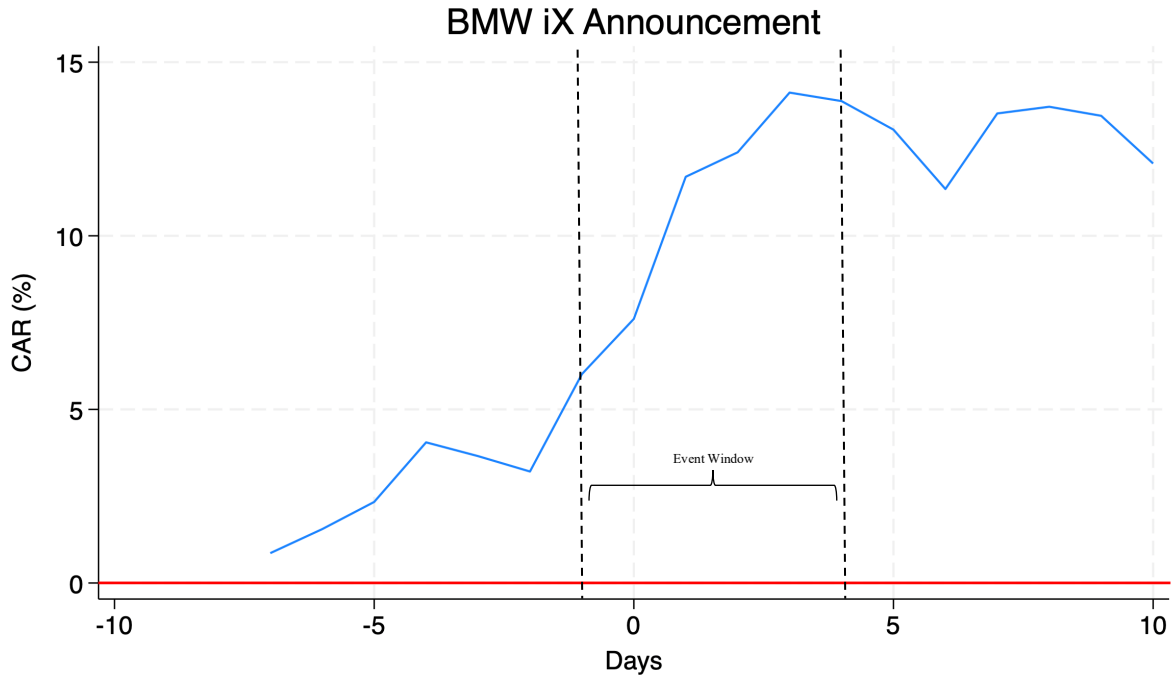
Appendix

Appendix 1: Graphs of abnormal stock returns of announcement events

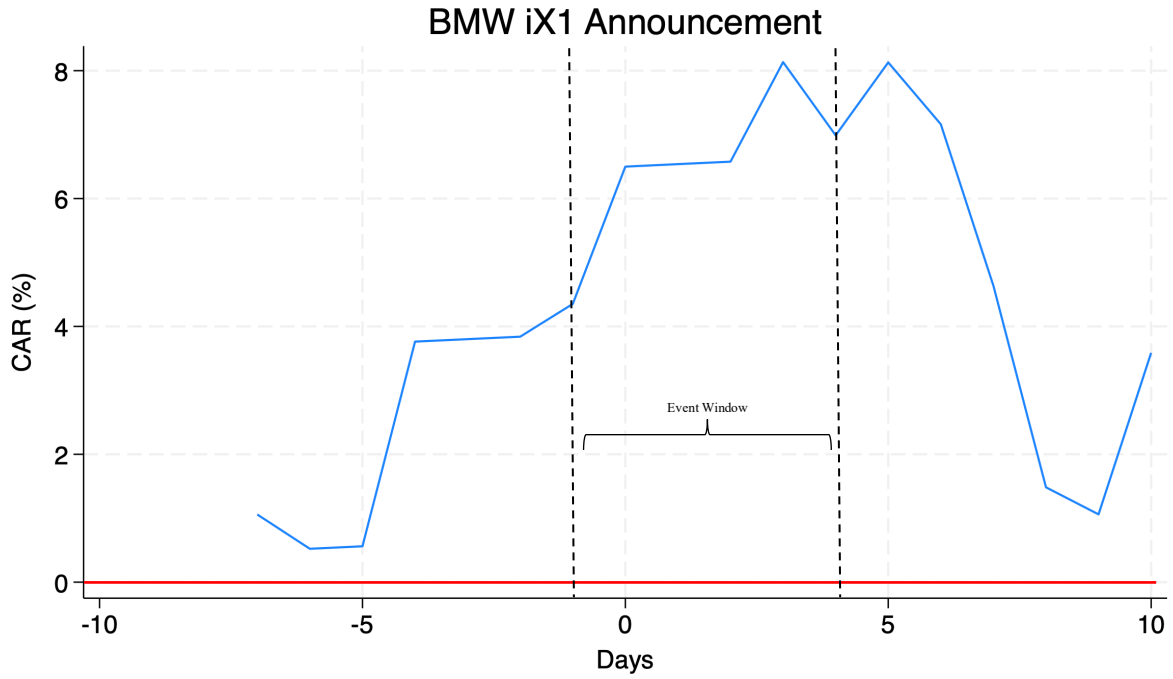
3.1: iX3 Announcement



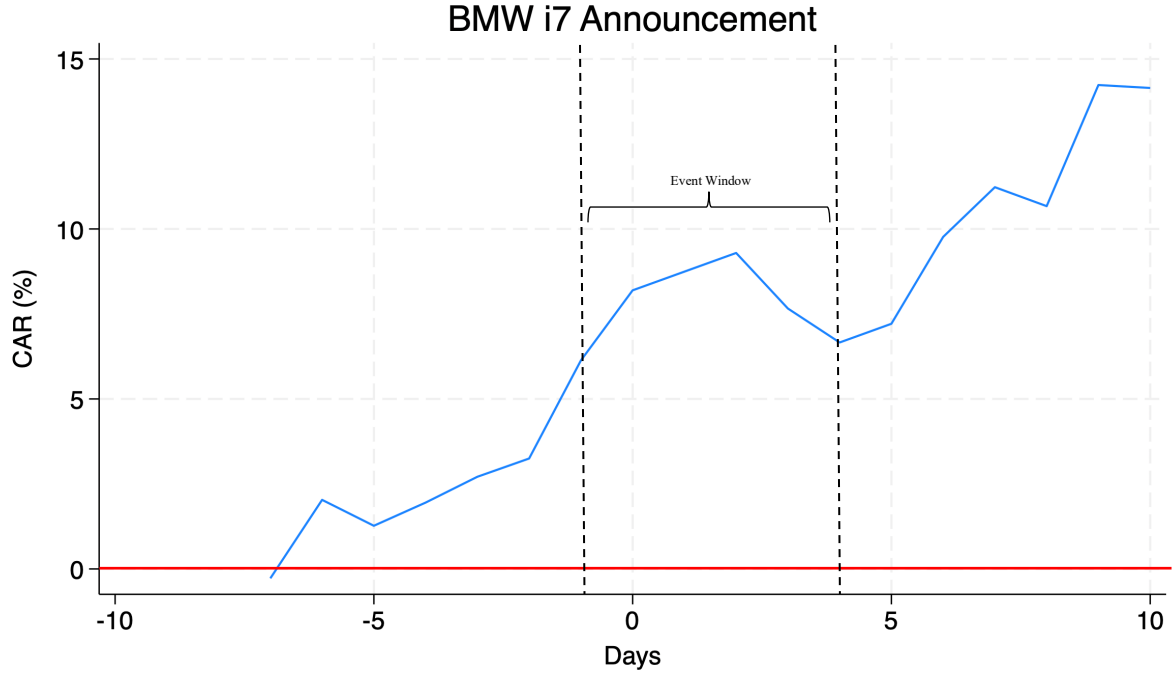
3.2: iX Announcement



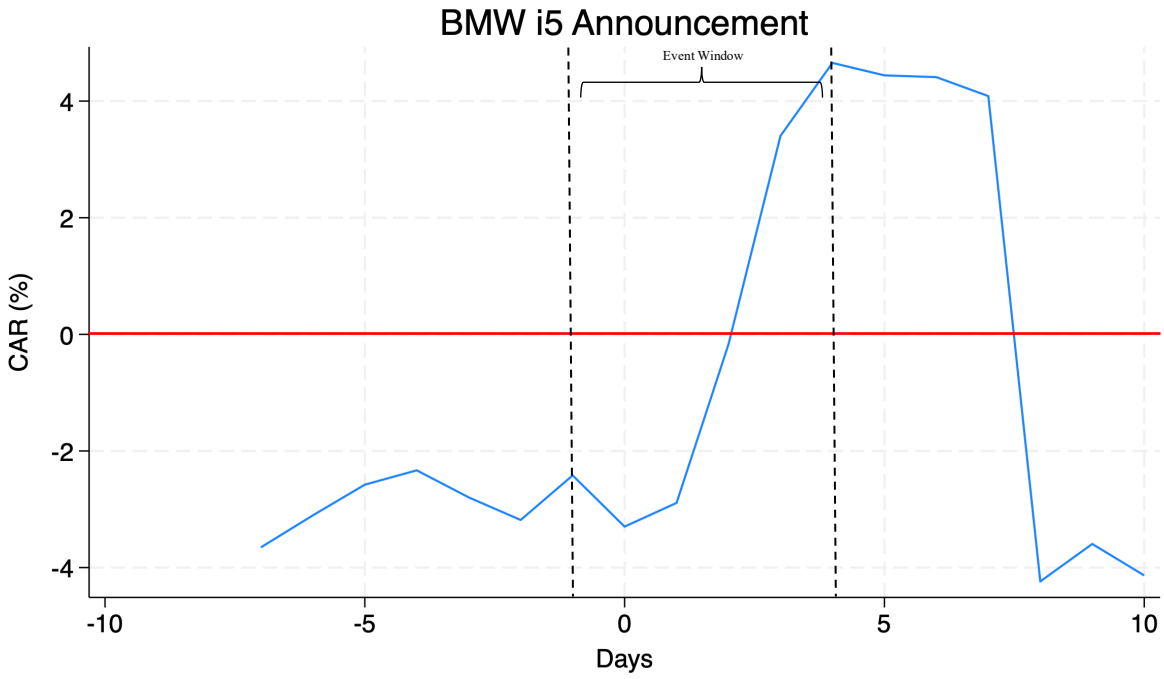
3.3: iX1 Announcement



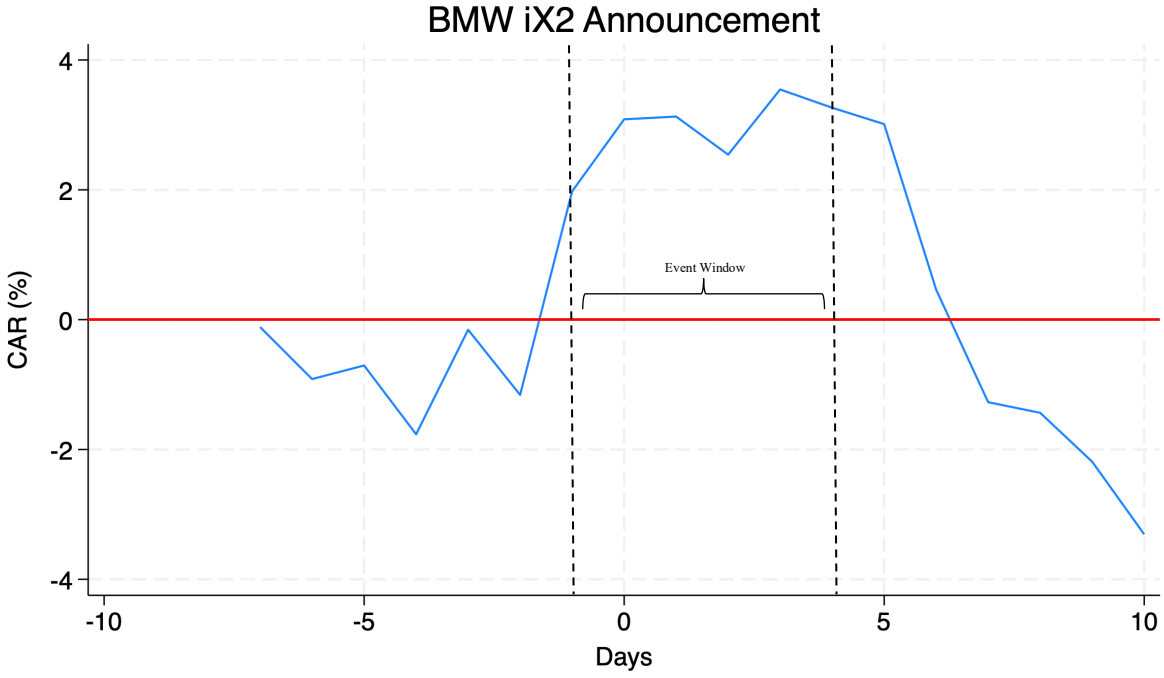
3.4: i7 Announcement



3.5: i5 Announcement

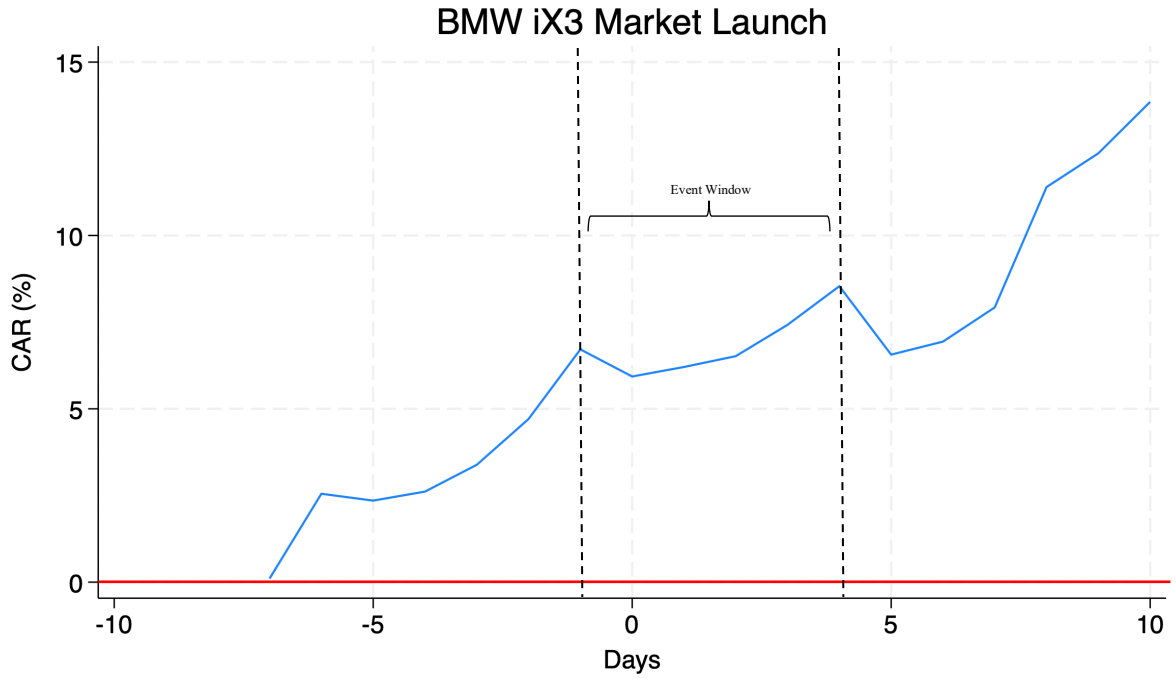


3.6: iX2 Announcement

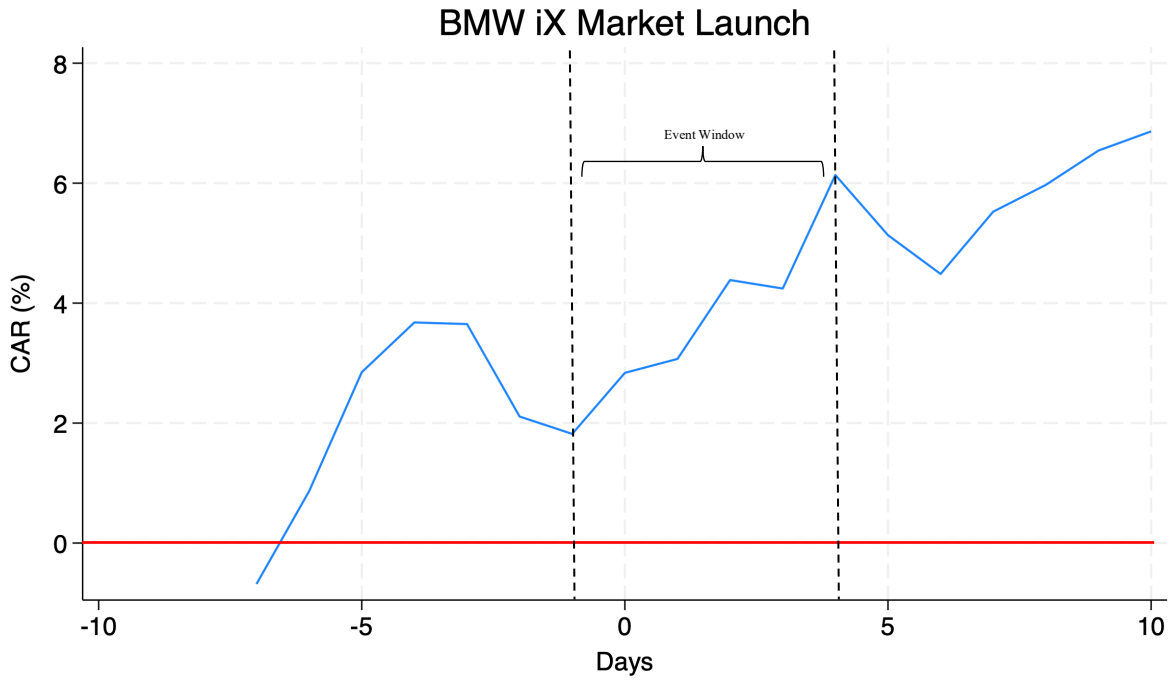


Appendix 2: Graphs of abnormal stock returns of market launch events

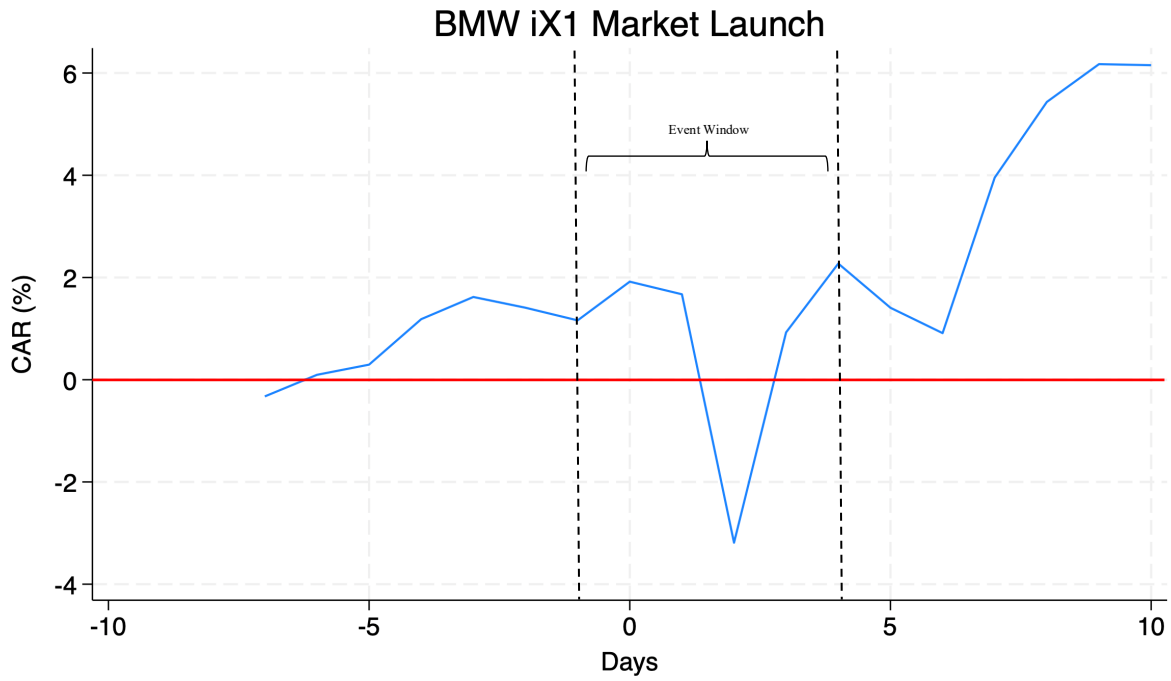
4.1: iX3 Market Launch



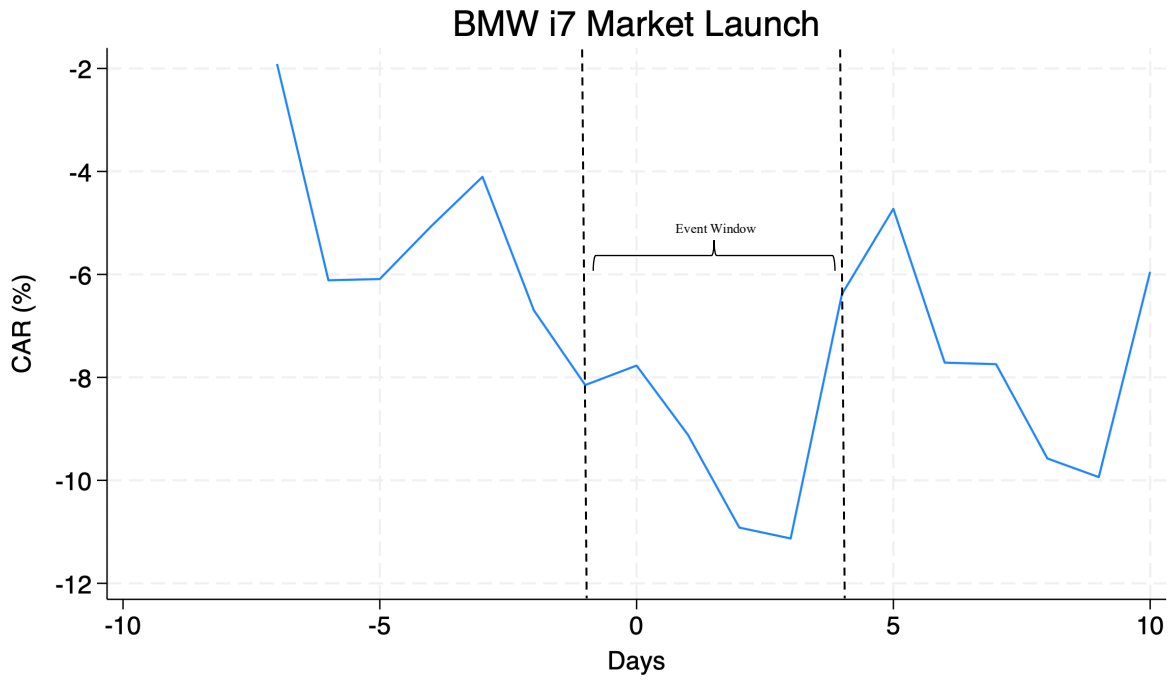
4.2: iX Market Launch



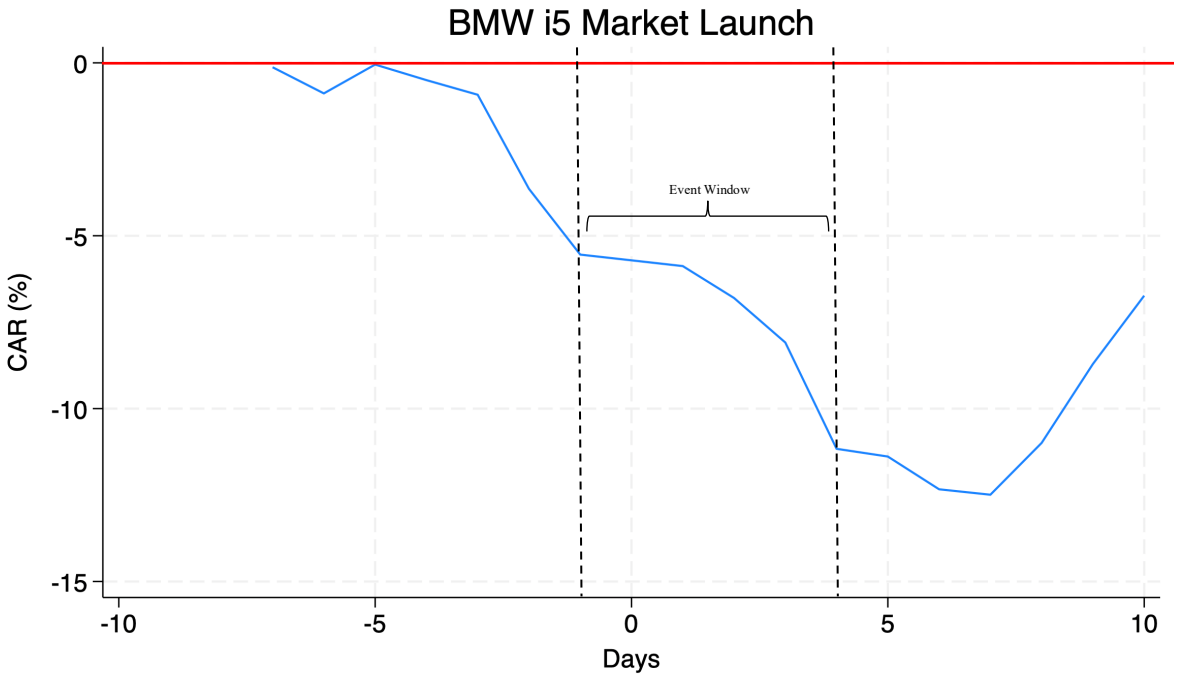
4.3: iX1 Market Launch



4.4: i7 Market Launch



4.5: i5 Market Launch



4.6: iX2 Market Launch