

Impact of Apple's New iPhone Product Introduction on Apple's Abnormal Returns in the Smartphone Industry

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Abstract

Research purpose: Apple Inc. is the leading technological firm that regularly announces new product launches to the public. The study focuses on the impact of new iPhone launch events on Apple's stock abnormal return opportunities.

Research design: For the study, data on Apple's new iPhone launch were collected from Apple's official website, and data on Apple Inc.'s price, market, and risk-free rates were obtained from various reliable sources. The data on daily prices cover January 2006 to March 2026, and the iPhone introduction data cover January 2007 to March 2026. The study calculates abnormal returns (AR) and cumulative abnormal returns (CAR) around the introduction of the new iPhone model. Stata 19 was used to obtain event-study results using regression and statistical tests.

Findings: The study found a positive abnormal return on a short window, but the amount is too small to capture. However, the CAR is negative after the announcement date, consistent with the "buy the rumor, sell the news" effect. The results suggest that the stock often declines slightly relative to the broader market on the day of the announcement, likely because market expectations are already reflected in the stock price, inferring the events are predictable, which is consistent with semi-strong market efficiency. Additionally, this analysis reveals volatility in abnormal returns across short and long windows, as well as a subsequent recovery period that adjusts to market event information.

Research value and implications: Predictable events do not create value for shareholders because the market perceives such information as routine. The new product launch event affects Apple's stock price, but the market reacts based on its expectations. New information does not always signal positive market sentiment, given prevailing market conditions.

Contribution: The distinction between routine events and surprise events of the Apple iPhone launch and its different effects on the abnormal return in the capital market.

Limitations: For this event study of Apple stock returns, the selected window may miss investors' delayed reactions to new product launch information for technological products.

Keywords: Apple, iPhone, Excess returns, Event study, Abnormal returns, Cumulative abnormal return, Signal, Information

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1. Introduction

Apple is a renowned technology company worldwide. Apple is widely known for its unique products, such as the iPhone, iPad, Mac, Apple Watch, and AirPods. Apple product introductions are closely watched events by investors and the public. As the iPhone is Apple Inc.'s iconic product, the announcement of a new iPhone with innovations affects the firm's profitability, which investors observe and react to in the capital market accordingly. Investors' attention plays a significant role in the capital market share price movement. New product introduction events usually bring a message to the market that investors consider in the stock market. Market anticipation of the new product introduction generates a positive abnormal earnings opportunity (Grube et al., 2025). People try to beat the markets by making predictions and interpreting new information to earn excess returns over the risk-free rate. An abnormal return opportunity arises in the market when the perceived expectation exceeds the new product announcement's features (Ma et al., 2024). Market players react according to the new information available in the market. More non-financial new product innovation announcements positively influence market reaction, and disclosure news is a strong predictor of future sales growth (Chu et al., 2024). The immediate stock market reaction on announcement days is often characterized by a 'buy the rumor, sell the news' effect, suggesting that positive expectations may be priced in beforehand. Investors and the media's intense focus often leads to speculation and heightened volatility in Apple's stock price, creating a dynamic backdrop for analyzing market reactions to major corporate events.

According to the efficient market hypothesis, all publicly available information should be reflected in share prices, and there should be no abnormal return opportunities. In a semi-strong efficient market, stock prices reflect publicly available information (Fama, 1970). However, the market is not fully efficient and perfect, and there is information asymmetry. Sometimes, due to information asymmetry, investors capture excess returns. Behavioral finance suggests that highly publicized events, such as Apple iPhone product launches, can have a "buy the rumor, sell the news" effect, in which investors can earn excess returns from the event. Studies on Apple's stock performance have yielded mixed results, with some showing immediate post-announcement dips and others showing long-term gains.

Predictable events are considered routine and are shared with stockholders (MacKinlay, 1997). Apple's routine events followed the annual product release cycle. The capital market is surprised when the new product launch announcement event is highly innovative and features breakthrough products (Chaney et al., 1991). Earlier studies claimed that new product launch events generated positive abnormal returns, but some authors found that surprising events generate positive abnormal returns for innovation (Mickalowski et al., 2008; Chu et al., 2024). Despite many event studies on firms, little attention has been paid to routine and surprising events that generate abnormal returns in technology firms. New product innovation news signals to the market. Identifying innovations in the new product introduction announcement creates an abnormal return opportunity relative to the market, which is the key gap in the analysis. Additionally, how the market reacts to the predicted iPhone introduction events and to unpredictable news of new product launches. Even predicted events generate positive abnormal returns when market conditions are favorable, and the new product's target sales

exceed the goal. This study examines the market's valuation of innovation, market efficiency, and investor behavior. The event study of Apple Inc.'s announcement of a new product introduction conveys value-relevant information to investors. To analyze the iPhone launch event, the research determines whether the market values the introduction of the new iPhone as a pure information shock or as an anticipated event. This study also reveals how the market rewards breakthrough technological products and routine products. The findings of this research provide insights into the evolution of informational efficiency in the technological industry.

1.1 Objective of the Research

The main objective of this study is to examine the impact of information on Apple's new product introductions on its excess market return. The specific objectives of this research are as follows:

- i. To find out Apple's abnormal returns relative to market benchmarks for new iPhone launch events.
- ii. To evaluate the relationship and impact between Apple's routine new product launch events and its abnormal return.
- iii. To evaluate the relationship and impact between Apple's surprise new product launch events and its cumulative abnormal return.
- iv. To find the pattern of Apple's stock return after the new product announcement events.

1.2 Research Questions

To find out the objective of the research, the following study questions have been designed to find the answer:

- i. Do Apple's product launch announcements generate short-term abnormal returns?
- ii. Does Apple's product introduction information significantly affect its market excess return when the events occur as a routine?
- iii. How do the investors react when the new product launch information comes as a surprise?
- iv. Does the excess return pattern of stock price behavior sustain over the subsequent long window?

2. Literature Review

Grube et al. (2025) conducted a meta-analysis of 58 independent studies to find that the market rewards firms that announce new product launches. They found that new product launch events have yielded an average abnormal return of 0.69%. They also highlighted important heterogeneity across industries and firms, driven by regulatory approval and events outside the U.S. They claimed that the leak of information about the new product launch event led to the predicted effect.

Wang (2025) investigates the relationship between Apple's stock price movement and its new product announcements from 2020 to 2024. The study uses an event study methodology to determine whether the stock exhibits a trend on the day of release, in the subsequent days, and over the next 12 months, considering products such as the M-series chips and Vision Pro.

The author analyzes Apple's strategies in product ecosystems, innovation, and design that influence purchase decisions and ensure brand loyalty.

Chu et al. (2024) examined voluntary disclosure of new product information to the market to forecast market reactions and to project future sales. They found that the market reacts positively to the disclosure of highly innovative products. Sales also increase following the announcement of the new product innovation in the market. They claimed that the market reacts 23% higher to a one-standard-deviation increase in voluntary disclosure and that sales will grow, on average, by \$328 million annually.

Ma et al. (2024) investigated the influence of investors' attention on the stock market following a new product introduction announcement. They found that established firms that provide a continuous product-introduction signal at fixed intervals do not create abnormal return opportunities due to the price-in effect, whereby the market adjusts stock prices in response to new product introductions. They claimed that the new product announcement may generate a significant excess return if it surpasses market expectations.

Kadan et al. (2018) conducted an empirical study on the "buy the rumor, sell the news" events. They found that an abnormal return opportunity was generated by private information about the upgrades. They claimed that traders buy before the announcement date and sell the stock once public information becomes available.

Chen et al. (2017) investigated the long-term market performance of the firm's new product introduction. They found that a new product announcement generates a positive excess return, and the abnormal return opportunity persists for 3 to 5 years after the announcement. They suggested that the financial market initially underreacts to an announcement of a new product introduction but later adjusts accordingly. They claimed that the excess returns from the new product launch announcement are driven primarily by the firm's background, size, marketing capabilities, and the timing of the new product introduction.

Mickalowski et al. (2008) found that Apple's stock experienced a significant positive abnormal return during new product introduction events. They claimed that the market perceived the launch of new smartphones as disruptive technology. They argued that the launch of the new smartphone model created significant information asymmetry, which was reflected in the market reaction for the investors.

Fama and French (2004) examined the capital asset pricing model (CAPM) and found that the traditional CAPM has the limitation of relying on a single market risk factor to explain asset returns. They claimed that the multi-factor model includes firm size, value, margin, and investment as determinants of asset returns.

Barber and Lyon (1997) analyzed factors determining the long-run abnormal equity return by using the event studies. They found that the standard method for estimating the long-run abnormal stock return is unreliable and biased.

Mackinlay (1997) is the standard modern reference on event-study design, estimation windows, choice of expected-return model, and inference. The paper is widely accepted for conducting event studies to measure the impact of events on firm value using stock price

changes. The author's methodology is based on the Efficient Market Hypothesis and assumes an immediate market reaction to measure economic impact. By using these research recommendations, the study has developed a model for estimation windows and cross-sectional inference.

Fama and French (1993) conducted a study of the common risk factors underlying stock and bond returns. They identified five factors that explain the returns of a firm's stock and bonds. They claimed that these factors share systematic risk empirically in asset pricing, although not all those determinants are arbitrary.

Jegadeesh and Titman (1993) explored the profitability of a momentum-based trading strategy. They found that stocks with higher short-term returns (3 to 12 months' returns) have continued to outperform. They claimed that the momentum effect yields substantial abnormal returns.

Chaney et al. (1991) conducted a study on the impact of new product introductions on firms' market value and found that new product introductions increase firms' market value, resulting in positive abnormal returns for the announcement firm. This study provides a benchmark for the event-study methodology to analyze changes in market value following new product announcements.

Brown & Warner (1985) discuss the properties of daily returns and the test statistics appropriate for event studies using daily data. This work is considered a foundational work in event study methodology in finance. The research effectively handled autocorrelation and changes in variance around events. The author explored the application of event studies to daily stock return data to identify optimal statistical procedures and address potential issues such as non-synchronous trading.

Market reaction theories concern investors' responses to new product introductions. Fama (1970) developed an efficient market hypothesis and demonstrated that the market price of a stock reflects all available market information. So, the abnormal return opportunity arises only when events surprise market expectations. Behavioral theories explain investors' post-event market reactions. De Bondt and Thaler (1985) argued that assets are mispriced during high-profile events due to cognitive biases. They claimed that investors violate the buyers' rule during dramatic news events. Market price may also react reversely due to "buy the rumor, sell the news". The adaptive market hypothesis and smartphone cyclicity theory suggest that investors' market reactions are highly dependent on macroeconomic conditions and the industry's product life cycle. Lo (2004) designed the adaptive market hypothesis and demonstrated that market efficiency is dynamic, changing over time with the market environments. The market reaction to an event is also tied to the broader macroeconomic environment. The market environment fluctuates, and the market participants try to adapt to survive in the competitive market.

The existing literature discusses various event study methodologies for measuring the market's reaction to Apple's announcements. This study focuses on the short-term abnormal return (AR) on the event day itself and the market price effect in the aftermath. Different literature analyses of longer event windows often revealed different patterns. Research indicates that while the initial reaction might be subdued, a recovery period often follows,

with studies finding average gains of over 10% in the six months after the product launch. It suggests that the true impact of a new product is realized as sales figures emerge and consumer demand is quantified. The success of products like the original iPad, which saw a significant rise in stock value in the months after its release, underscores the importance of actual product performance over initial market sentiment. This study investigates the abnormal return opportunity associated with Apple Inc.'s new product launch.

Some studies have examined new product introduction and profitability, but few have examined the effect of a specific product introduction on market abnormal returns for routine events and the surprise events. Even other studies have not explored the CAPM model event study. Very few studies have examined the abnormal return and cumulative abnormal return of a firm (Apple Inc.) for a specific product (iPhone) in the technology industry. As Apple's iPhone accounts for more than 50% of its revenue, the abnormal return analysis of iPhone launch events reveals the form of market efficiency in response to new information.

2.1 Research Hypothesis Design

To achieve the research objectives, the following hypotheses have been formulated:

H1: Unpredictable new model iPhone launch announcements generate positive abnormal returns in the short (-1, 0, +1 day) and medium (-5, 0, +5 days) windows.

According to the efficient market hypothesis, unexpected information generates an excess-return opportunity. Unpredictable events provide new information for the market, deviate from existing expectations, and generate abnormal returns.

H2: Apple's routine new product introduction events create zero or negative excess returns.

Under the efficient market hypothesis, routine events do not create value for shareholders. Market participants treat the established annual release cycle as highly predictable and price accordingly. Behavioral finance theories explain that those routine events may trigger negative abnormal returns due to the "buy the rumor, sell the news" effect.

H3: Apple's excess return opportunities are short-term and do not last for the longer (-10 to +10 days) window.

According to the efficient market hypothesis, an abnormal return opportunity disappears quickly once the information is available to all. The behavioral effects may create short-term momentum, but in the long run, the discrepancy disappears. The market reacts to available information and quickly rectifies any discrepancies.

3. Research Methodology

3.1 Data and Sample

For this event study, data on Apple Inc.'s new product launches have been collected from Apple's official website. Apple's Keynote dates are gathered from the official Apple events/Apple press-release archives, as well as curated lists. The study focuses on iPhone announcement events to calculate abnormal returns. The iPhone announcement events have spanned from the first iPhone launch on January 9, 2007, to March 2026. Apple's stock return and market return, based on the Standard & Poor's 500 index closing price data, were collected

from the Yahoo Finance database from 2007 through 2026, using daily returns. Risk-free rate data were collected from the Fama-French 3-factor model. The capital asset pricing model (CAPM) has been used to estimate Apple Inc.'s excess return. Stata-19 tools for event study have been used to determine the study's objective, and ordinary least squares regression has been used. To calculate expected future returns, the excess return market model is used to estimate the constant and beta coefficients for each Apple iPhone event, with a 250-day estimation window ending 30 days prior to the event date. Additionally, abnormal returns and cumulative abnormal returns have been calculated for short-window, medium-window, and long-window returns, which will be used to examine the relationship and impact of new product launch announcements. The short window is the immediate price reaction around the event date, from -1 to +1 day; the medium window is -3 to +3 and -5 to +5 days. And the longer window is -10 to +10 days to capture extended price reactions. Moreover, a cross-sectional cumulative abnormal return (CAR) regression model is used to assess the study's robustness. Additionally, the Patell Z-Test, a nonparametric sign test, and the study's significance test were conducted to assess the robustness of the findings. Major iPhone launch events considered the introduction of the iPhone 6, iPhone X, iPhone 12, and iPhone 15 models. The 5G model iPhone launch events are based on the iPhone 12, iPhone 13, iPhone 14, iPhone 15, iPhone 16, and iPhone 17. The new iPhone event is considered the iPhone (original) and the iPhone X model. The surprise variable in the model is the CAR, which is nonzero. Furthermore, the graphical presentation of the information has been generated using Stata tools.

3.2 Research Model

The following research model has been developed to find out the study objective. The Capital Asset Pricing Model (CAPM) is the most suitable model for a short-window event study for technological firms. The multifactor model requires longer estimation windows, which compromise the precision of excess-return calculations for the event. Additionally, CAPM ensures precision and comparability with prior event studies by avoiding factor contamination and reducing noise.

$$R_{A,t} - R_{rf,t} = \alpha + \beta(R_{mkt,t} - R_{rf,t}) + \varepsilon \quad (\text{Equation 1})$$

Where, $R_{A,t}$ = Return of Apple Stock for the t period

$R_{rf,t}$ = Risk-free rate of return t period (US 30-year treasury bond yield)

$R_{mkt,t}$ = Return on market for t period (GSPY)

α = Constant/ Intercept ; β = Regression coefficient (Risk) ; ε = Error term

Abnormal return model of Apple:

$$AR_{A,t} = \text{Actual } R_{A,t} - \text{Expected } R_{A,t} \quad (\text{Equation 2})$$

Where, $AR_{A,t}$ = Abnormal return of Apple stock for the t period; Expected $R_{A,t}$ = Model excess return

Apple's market excess return model due to the new product launch announcement:

$$R_{A,t} - R_{rf,t} = \alpha + \beta_1 \text{AppleEvent}_t + \varepsilon \quad (\text{Equation 3})$$

Here, $R_{A,t} - R_{rf,t}$ = Apple excess market return;

AppleEvent_t = Dummy variable (1 for announcement date for new products and 0 for no new product announcement)

α = Intercept; β_1 = Regression coefficient; ε = Error term

Cumulative abnormal return model of Apple based on events:

$$CAR(T1, T2) = \sum_{t=T1}^{T2} AR_{Apple, t} \quad (\text{Equation 4})$$

Where, CAR = Cumulative abnormal return for Apple; T1, T2 = AppleEvent_t AR Apple, t = Abnormal return of Apple

Cross-sectional CAR model:

$$CAR_{(-1,+1),i} = \alpha + \beta_1 \text{Major}_i + \beta_2 5G_i + \beta_3 \text{NewCategory}_i + \beta_4 \text{Surprise}_i + \varepsilon_i \quad (\text{Equation 5})$$

Major_i = Major iPhone events; 5G_i = 5G iPhone models; NewCategory_i = New version of iPhone

Surprise_i = Surprise event that generates CAR other than 0.

3.3 Apple Events for iPhone**Table 1:** Apple's new iPhone introduction announcement event with date

Announcement Date (M/D/Y)	Apple's new iPhone Introduction Events	Actual Product Release Date (M/D/Y)
1/9/2007	iPhone (original) announcement	6/29/2007
6/9/2008	iPhone 3G	7/11/2008
6/8/2009	iPhone 3GS	6/19/2009
6/7/2010	iPhone 4	6/24/2010
10/4/2011	iPhone 4S	10/14/2011
9/12/2012	iPhone 5	9/21/2012
9/10/2013	iPhone 5S & iPhone 5C	9/20/2013
9/9/2014	iPhone 6 & iPhone 6 Plus	9/19/2014
9/9/2015	iPhone 6S & iPhone 6S Plus	9/25/2015
3/21/2016	iPhone SE (1 st generation)	3/31/2016
9/7/2016	iPhone 7 & iPhone 7 Plus	9/16/2016
9/12/2017	iPhone 8 & iPhone 8 Plus	9/22/2017
9/12/2017	iPhone X	11/3/2017
9/12/2018	iPhone XS, iPhone XS Max	9/21/2018
9/12/2018	iPhone XR	10/26/2018
9/10/2019	iPhone 11, iPhone 11 Pro, iPhone 11 Pro Max	9/20/2019
4/15/2020	iPhone SE (2nd generation)	4/24/2020
10/13/2020	iPhone 12, iPhone 12 Pro	10/23/2020
10/13/2020	iPhone 12 mini, iPhone 12 Pro Max	11/13/2020
9/14/2021	iPhone 13, iPhone 13 mini, iPhone 13 Pro, and iPhone 13 Pro Max	9/24/2021
3/8/2022	iPhone SE (3rd generation)	3/18/2022
9/7/2022	iPhone 14, iPhone 14 Pro, and iPhone 14 Pro Max	9/16/2022
9/7/2022	iPhone 14 Plus	10/7/2022
9/12/2023	iPhone 15, iPhone 15 Plus, iPhone 15 Pro, and iPhone 15 Pro Max	9/22/2023
9/9/2024	iPhone 16, iPhone 16 Plus, iPhone 16 Pro, and iPhone 16 Pro Max	9/20/2024
2/19/2025	iPhone 16e	2/28/2025
9/9/2025	iPhone 17, iPhone 17 Air, iPhone 17 Pro, and iPhone 17 Pro Max	9/19/2025
3/2/2026	iPhone 17e	3/11/2026

Apple's new product announcement dates for iPhone are sourced from Apple Inc.'s official website. Table 1 shows that the first iPhone was launched on January 9, 2007. And each year Apple announces a new iPhone version, which is almost predictable to investors. The firm always aims to maintain consistency in its product launches. Most of the new product announcements are scheduled for September. Investors and the public expected Apple to launch a new iPhone every year in September, and this event influenced Apple's stock price as a predictable behavior. However, sometimes Apple announces the launch of a new iPhone model as a surprise event, and market trading behavior changes in response to that information. In 2013, Apple announced plans to launch multiple iPhone models on the same date. On the same date, the firm occasionally announced a different iPhone model and shared innovative information with stakeholders. During the COVID-19 pandemic, the new product launch event date was moved from September and later reinstated. In addition to the first iPhone announcement, a few other events surprised the market with the iPhone's innovative features.

4. Result Analysis and Discussion

4.1 Descriptive statistics

Table 2: Descriptive Statistics

	Observations	Mean	Standard Deviation	Min	Max
Daily Apple return	4410	0.0006836	0.0197154	-0.131886	0.1426175
Daily market return	4410	0.0003847	0.0127329	-0.099949	0.1024574
Daily risk-free rate of return	4410	0.0000628	0.0000812	0	0.0002
Apple's excess return	4410	0.0006208	0.0197134	-0.131886	0.1424175
Market excess return	4410	0.0003219	0.0127324	-0.100049	0.1024574
Apple iPhone events date (M/D/Y)	28	-	-	1/9/2007	3/2/2026

Table 2 represents the descriptive statistics of the research. The total number of observations for this study is 4410. The mean daily Apple return is 0.068%, with very high daily return volatility. The average daily market return is 0.038%, with lower volatility than Apple's daily returns, and it serves as a proxy for the Standard & Poor's 500 index. And the daily average risk-free return is 0.0062% with less volatility. Apple's average daily excess return during this period is 0.062%, and the average daily market excess return is 0.032%. The return volatility is high, as indicated by a high standard deviation, suggesting that the market incorporates information as it becomes public. The maximum daily Apple's return is 14.26%, and the maximum daily market return is 10.25%, where the minimum return is negative. Additionally, the volatility of Apple's daily returns exceeds that of the market's, implying Apple's price movements are larger than the market's. For this type of technology firm, price volatility is common due to new information (events) entering the market that affects stock valuation. Apple's stock price volatility reflects that it is information-sensitive to new information, such as innovations.

4.2 Event-wise Regression for the Excess Return of Apple Inc.

Table 3: OLS regression output

Events	Alpha	Beta coefficient (Std. error)
iPhone original	0.0021	1.4248*** (0.2888)
iPhone 3G	0.0012	1.1918*** (0.1546)
iPhone 3GS	-0.0002	0.8264*** (0.0731)
iPhone 4	0.0015	1.1325*** (0.1170)
iPhone 4S	0.0004	0.8889*** (0.0679)
iPhone 5	0.0007	0.9234*** (0.1345)
iPhone 5S & iPhone 5C	-0.0035	0.7600*** (0.2500)
iPhone 6 & iPhone 6 Plus	-0.0007	0.6127*** (0.1723)
iPhone 6S & iPhone 6S Plus	-0.0005	1.0865*** (0.1322)
iPhone SE (1st generation)	-0.0018	1.2527*** (0.1020)
iPhone 7 & iPhone 7 Plus	-0.0012	1.1401*** (0.1123)
iPhone 8 & iPhone 8 Plus	0.0011	1.3617*** (0.1720)
iPhone X	0.0011	1.3617*** (0.1720)
iPhone XS, iPhone XS Max	0.0001	1.1150*** (0.1108)
iPhone XR	0.0001	1.1150*** (0.1108)
iPhone 11, iPhone 11 Pro, iPhone 11 Pro Max	0.0000	1.5435*** (0.1231)
iPhone SE (2nd generation)	0.0020	1.2059*** (0.0502)
iPhone 12, iPhone 12 Pro	0.0019	1.0606*** (0.0603)
iPhone 12 mini, iPhone 12 Pro Max	0.0019	1.0606*** (0.0603)
iPhone 13, iPhone 13 mini, iPhone 13 Pro, and iPhone 13 Pro Max	-0.0006	1.2845*** (0.1323)
iPhone SE (3rd generation)	0.0011	1.1929*** (0.1088)
iPhone 14, iPhone 14 Pro, and iPhone 14 Pro Max	0.0004	1.2959*** (0.0589)
iPhone 14 Plus	0.0004	1.2959*** (0.0589)
iPhone 15, iPhone 15 Plus, iPhone 15 Pro, and iPhone 15 Pro Max	0.0010	1.2171*** (0.0781)
iPhone 16, iPhone 16 Plus, iPhone 16 Pro, and iPhone 16 Pro Max	0.0004	0.9478*** (0.1389)
iPhone 16e	0.0008	0.8340*** (0.1188)
iPhone 17, iPhone 17 Air, iPhone 17 Pro, and iPhone 17 Pro Max	-0.0002	1.3499*** (0.0833)
iPhone 17e	0.0009	0.8747*** (0.1477)

***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level

Table 3 presents Apple's excess returns, which co-move with the excess market return prior to each new iPhone model introduction. These alpha and beta coefficients are important because they are used to compute expected returns and abnormal returns. The beta value for all events ranges from 0.6127 to 1.5435. Here, all the beta coefficient values are statistically significant at the 1% level, which implies that Apple's excess return shows a strong positive movement with the market excess return. These findings are consistent with those of Ma et al. (2024), who find that investors' reactions to predictable announcements generate little to no abnormal return opportunities. Beta values vary across different iPhone models, indicating

that Apple's systematic risk shifts over time to reflect market sentiment. The standard deviation of the beta values is very small, indicating less volatility. The alpha values are very small, suggesting that Apple's excess return is not systematically generated above or below the predicted return at the given risk level during the window, which aligns with the semi-strong form of the efficient market hypothesis theory. These alpha and beta values are consistent with the market model used to calculate the abnormal return for each event.

4.3 Abnormal Return for Short and Long Windows

Table 4: Abnormal return across windows

Event time	Average abnormal return
-10	0.0026673
-8	-0.0018339
-7	-0.0024301
-6	-0.0019315
-5	-0.0022998
-4	-0.0018587
-3	0.0020047
-1	0.0113627
0	-0.0038587
1	-0.0010184
2	-0.0054744
3	-0.0076359
4	-0.0119709
6	0.0034700
7	0.0031264
8	-0.0002446
9	-0.0020072
10	0.0007782

Table 4 reports the abnormal return across different windows. The average abnormal return for Apple Inc. across short- to long-term windows indicates a mixed market reaction. In this study, the maximum long window is set to 10 business days after the new iPhone announcement. The daily average abnormal opportunity prior to the new Apple iPhone events is 0.02%, and the market reaction in trading the day before the new iPhone model announcement is 1.136%, which is a very lucrative opportunity for investors. On the day of the new iPhone product announcement (day 0), the abnormal return is -0.3850%. For each iPhone launch announcement day, the market perceives the events as predictable or routine. For that reason, the market exhibits a positive abnormal return before the new iPhone announcement and a negative abnormal return after the announcement, consistent with the "buy the rumor, sell the news" effect. The table also shows that the abnormal return opportunities on the 6th, 7th, and 10th days after the new product events generate positive abnormal returns. The positive abnormal return in the long window is due to positive sales growth or to positive market conditions.

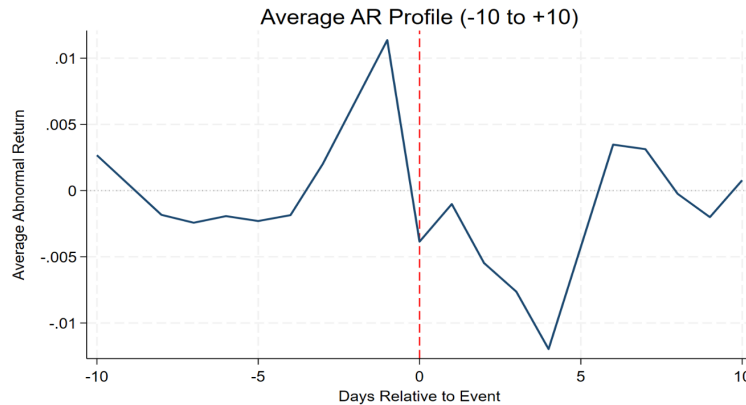


Figure 1: Apple's average abnormal return for the iPhone events across different windows

Figure 1 plots the average excess return opportunity of the new iPhone introduction events in the market for 10-day windows prior to and after the announcement date. Day 0 is the date of the new iPhone model announcement event. The mean abnormal return for Apple stock is shown in the line graph for short-, medium-, and long-window returns. The abnormal return line shows a spike before the new event announcement date, with the highest average excess return opportunity occurring 1 day prior to the event announcement. Then the abnormal return opportunity declines, reaching its lowest point on the 4th day after the event date. After the medium announcement window, the excess return opportunity increases and becomes positive on the 6th and 7th days following the event. Due to the “buy the rumor, sell the news” effect, which is aligned with the findings of Kadan et al. (2018), the mean abnormal return after the event date is the opposite of the announcement information in the days prior to the event. The market reacts to the announcement information as routine news of those events.

4.3 Cumulative Abnormal Return (CAR) for Each iPhone Launch Event

Table 5: Cumulative abnormal return for each iPhone event across different windows

Apple's new Model iPhone	Events Date	Event ID	CAR (-1 to +1)	CAR (-3 to +3)	CAR (-5 to +5)	CAR (-10 to +10)
iPhone (original)	1/9/2007	1	0.1206	0.0759	0.0937	-0.0035
iPhone 3G	6/9/2008	2	0.0237	-0.0153	-0.0427	0.0016
iPhone 3GS	6/8/2009	3	-0.0106	-0.0232	-0.0133	-0.0154
iPhone 4	6/7/2010	4	-0.0203	-0.0342	-0.0565	0.0051
iPhone 4S	10/4/2011	5	-0.0267	-0.0590	-0.0849	-0.0336
iPhone 5	9/12/2012	6	0.0082	0.0159	0.0176	-0.0013
iPhone 5S & iPhone 5C	9/10/2013	7	-0.0800	-0.0785	-0.0735	-0.0096
iPhone 6 & iPhone 6 Plus	9/9/2014	8	0.0297	0.0408	0.0403	-0.0134
iPhone 6S & iPhone 6S Plus	9/9/2015	9	0.0129	0.0230	0.0303	0.0052
iPhone SE (1st generation)	3/21/2016	10	0.0105	0.0102	0.0102	0.0534

Apple's new Model iPhone	Events Date	Event ID	CAR (-1 to +1)	CAR (-3 to +3)	CAR (-5 to +5)	CAR (-10 to +10)
iPhone 7 & iPhone 7 Plus	9/7/2016	11	-0.0154	-0.0089	-0.0032	0.1057
iPhone 8 & iPhone 8 Plus	9/12/2017	12	-0.0193	-0.0210	-0.0413	-0.0948
iPhone X	9/12/2017	13	-0.0193	-0.0210	-0.0413	-0.0948
iPhone XS, iPhone XS Max	9/12/2018	14	0.0255	0.0136	0.0079	-0.0257
iPhone XR	9/12/2018	15	0.0255	0.0136	0.0079	-0.0257
iPhone 11, iPhone 11 Pro, iPhone 11 Pro Max	9/10/2019	16	0.0316	0.0065	0.0045	-0.0018
iPhone SE (2nd generation)	4/15/2020	17	0.0256	-0.0220	-0.0220	-0.0551
iPhone 12, iPhone 12 Pro	10/13/2020	18	-0.0162	-0.0366	-0.0419	-0.0890
iPhone 12 mini, iPhone 12 Pro Max	10/13/2020	19	-0.0162	-0.0366	-0.0419	-0.0890
iPhone 13, iPhone 13 mini, iPhone 13 Pro, and iPhone 13 Pro Max	9/14/2021	20	-0.0056	-0.0107	-0.0339	-0.0402
iPhone SE (3rd generation)	3/8/2022	21	-0.0012	-0.0344	-0.0414	-0.0379
iPhone 14, iPhone 14 Pro, and iPhone 14 Pro Max	9/7/2022	22	-0.0334	-0.0347	-0.0348	-0.0425
iPhone 14 Plus	9/7/2022	23	-0.0334	-0.0347	-0.0348	-0.0425
iPhone 15, iPhone 15 Plus, iPhone 15 Pro, and iPhone 15 Pro Max	9/12/2023	24	-0.0256	-0.0183	-0.0442	-0.0580
iPhone 16, iPhone 16 Plus, iPhone 16 Pro, and iPhone 16 Pro Max	9/9/2024	25	-0.0083	-0.0051	-0.0100	0.0184
iPhone 16e	2/19/2025	26	0.0056	0.0180	0.0299	0.0593
iPhone 17, iPhone 17 Air, iPhone 17 Pro, and iPhone 17 Pro Max	9/9/2025	27	-0.0549	-0.0337	-0.0351	0.0231
iPhone 17e	3/2/2026	28	0	-0.0298	-0.0310	-0.0082

Table 5 presents the cumulative abnormal returns for each Apple iPhone event across different windows. Cumulative abnormal return for short window (-1 day to +1 day) is positive for the iPhone model such as iPhone original, iPhone 3G, iPhone 5; iPhone 6; iPhone 6 Plus, iPhone 6s, iPhone 6s Plus, iPhone SE (1st generation), iPhone XS, iPhone XS Max, iPhone XR, iPhone 11; iPhone 11 Pro, iPhone 11 Pro Max, iPhone SE (2nd generation), iPhone 16e. Most of the positive CAR sustained for medium windows (-3 day to +3 day and -5 day to +5 day). However, the CAR for iPhone 6S & iPhone 6S Plus, iPhone SE (1st generation), and iPhone 16e events remain positive across all windows. The table also shows that the CAR becomes positive in the long window, where it was negative in the short and medium windows. The market shows an initial overreaction to the news, resulting in a negative cumulative abnormal return, then corrects itself after the pure announcement effect. The rest of the new-model iPhone events show negative cumulative abnormal returns across different windows because the market considered them predictable and reacted accordingly. Economically, a negative CAR implies that Apple's routine iPhone launch events do not create immediate value for shareholders and can trigger short-term price corrections

due to market expectations. According to the efficient market hypothesis, when there is no new information about a stock, there will be no positive excess return. A new product launch signals a competitive advantage in the market. According to signal theory, when new product launch events do not send positive signals to the market, they result in negative returns.

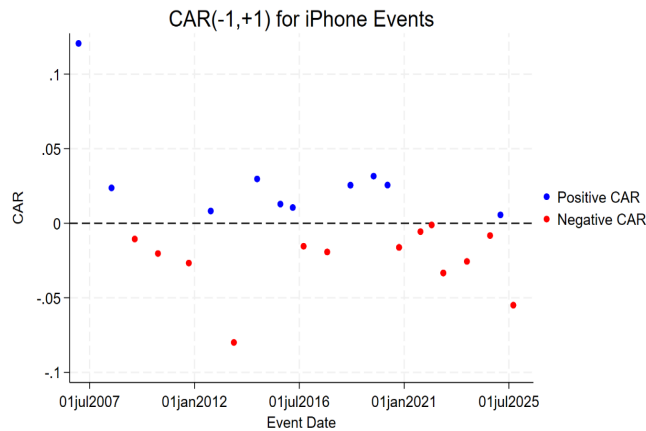


Figure 2: Apple's cumulative abnormal return with the iPhone launch event date

Figure 2 demonstrates the cumulative abnormal return for a short window. The figure shows the positive CAR in blue dots and the negative CAR in red dots for new iPhone model introductions. Investors reacted differently to all iPhone launch events. Some events create value, while others destroy it in Apple Inc.'s short window. A total of 10 events among the 28 events create a short-window positive abnormal return for Apple's iPhone introductions. The Positive CAR represents new information in the market and creates an excess-earnings opportunity. The negative CAR implies that those events are predictable, and the market sells the news ahead of the new iPhone announcement date. Most of the time, Apple's new iPhone model introductions are predictable, while a few are surprising and innovative, sparking market reactions with new information. Apple's unpredictable events and strategic product innovations generate positive CAR, whereas its routine, incremental updates create negative CAR.

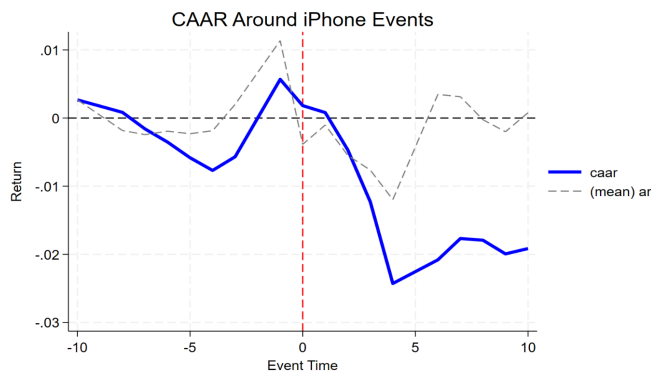


Figure 3: Apple's cumulative abnormal return with the iPhone launch event date

Figure 3 demonstrates the Cumulative average abnormal return and the average abnormal return for each Apple iPhone event. CAAR follows the mean AR line, but over the 10-day window, it fails to recover from the negative market reaction to Apple's event. The CAAR remains positive on the date of the event due to the cumulation of prior positive abnormal returns. However, after a short window, the CAAR declines sharply to negative returns. Since many iPhone launch events are predictable, the market has already priced in the expectation of abnormal returns on the introduction of new iPhone models. The CAAR line also implies that, on average, the cumulative excess return after the new model iPhone announcement becomes negative, meaning that after the event date, holding Apple's stock is valueless. The market already accommodates the "buy the rumor, sell the news" for the predictable events. And for that reason, Apple's new iPhone model introduction event does not generate much additional excess return opportunity. The expected incremental upgrade of the iPhone model does not provide positive information to the market, suggesting a negative abnormal return.

4.5 Significance test of the Abnormal Return

Table 6: T-test for the average abnormal return

	AR Mean	t
Average AR	-0.0010642	-0.9131
***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.		

Table 6 shows the t-test of the average abnormal return. The average abnormal return across all iPhone launch events is -0.106%. As the t-value is very low, the AR means is not statistically significant. The abnormal return opportunity is negative here, indicating that Apple's iPhone launch events are highly predictable and that the information is already reflected in the price. So, the market does not reward itself with a positive abnormal return on the announcement date, which is consistent with the semi-strong form of market efficiency.

4.5.1 Significance test of the cumulative abnormal return

Table 7: T-test for the cumulative abnormal return

	CAR (-1 to +1)	CAR (-3 to +3)	CAR (-5 to +5)	CAR (-10 to +10)
Average CAR	-0.0024792	-0.0121488*	-0.0173378**	-0.018223**
***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.				

Table 7 reports the significance tests of the cumulative abnormal returns for Apple iPhone events across different windows. In the short window, the average CAR is negative but not statistically significant, indicating that the market is not reacting to the announcement date of the new iPhone model. During the medium window (-3 to +3 days and -5 to +5 days), the cumulative abnormal return remains negative and is statistically significant at the 5% and 10% levels. The medium window indicates that the market gradually corrects its expectations after the event date. For the longer window, the CAR remains negative, and the result is statistically significant at the 5% level. So, the negative abnormal return is consistent even in the longer window after Apple's announcement of the new iPhone model, implying that the market does not reverse its initial reaction event in the longer period, which is aligned with Ma et al. (2024), who found that the positive CAR is possible when the new product launch event is

assumed by the market as innovative. This result suggests that iPhone announcements are highly predictable to the public and that the information is already reflected in the stock price. The announcement of the new iPhone model does not trigger a positive abnormal return, as it appears to be a predictable event. As with the efficient market hypothesis, these predictable events are already reflected in the market price of Apple's stock. So, the market is not rewarding for that event information.

4.6 Patell Z-test

Table 8: Patell Z-test for abnormal return due to the iPhone launch events

Event time	Standardized AR	Patell z-value
-1	0.5440259	0.9422805
0	-0.1847467	-0.3199907
1	-0.0487608	-0.0844562

Table 8 presents the Patell Z-test for the abnormal returns associated with Apple's new-model iPhone introduction events. The test is also used for the standardized residual test, which indicates whether the events have a statistically significant influence on the stock price. The standardized abnormal return is positive, but the Patell z-value is below 1.96 at the 5% significance level. The market creates a positive abnormal opportunity prior to the event date, although it is not statistically significant at 5% level. On the event date and the day after the announcement, the abnormal return is negative, and the Patell z-value is not statistically significant, indicating that the event is predictable to investors and that they have already reacted to the announcement, which supports the efficient market hypothesis. These results are also consistent with the "buy the rumor, sell the news" effect.

4.7 Nonparametric Sign Test

Table 9: Sign test result

	Mean	Standard deviation
Sign	0.4150943	0.4974536

Table 8 reports the results of the sign test for Apple's abnormal returns around new product introductions. The sign test calculates sign = 1 if AR > 0, and 0 otherwise. The non-parametric test results show that 41.51% of the abnormal returns are positive in the short window. The mean value is less than the expected 50%, indicating that the abnormal return sign is negative. So, this sign test confirms that Apple's new iPhone launch events are predictable for investors, consistent with the "buy the rumor, sell the news" effect.

4.8 Robustness Check for the Cross-sectional CAR Model

Table 10: Robustness regression for CAR model

CAR short window	Beta coefficient
Major iPhone launch events	-0.0178017** (0.0085009)
Surprise events	0.0012133 (0.0200089)
Constant	-0.0025606 (0.0155428)
***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. N.B.: The 5G and New Category variables are omitted due to multicollinearity.	

Table 10 reports the cross-sectional regression model for cumulative abnormal returns over a short window to assess robustness. The major event and surprise variables are considered for the introduction of the iPhone 6, iPhone X, iPhone 12, and iPhone 15 models, and the surprise variable of the model is the CAR, which is not equal to 0. The result shows that major iPhone introduction events generate a negative cumulative abnormal return of 1.78% in the short window around the event date. The beta value for the major iPhone launch events is statistically significant at the 5% level. And the surprise events are positive CAR, but they are not statistically significant at the 5% level. As the major events CAR for the short window is negative, the market anticipated the events fully and reflected this information in the price, so there is no positive abnormal return. Additionally, the major events surrounding Apple's iPhone launch announcement are highly anticipated, and the market reaction to the CAR is negative due to "sell-the-news" behavior. So, each event in Apple's new product introduction is fully anticipated, reflected in the stock price, and investors adjust their behavior accordingly.

5. Findings of the Study

Apple's average excess return is slightly negative during iPhone announcement events, unlike Mickalowski et al. (2008), who found a positive abnormal return for new product launch events. So, the market does not reward the new iPhone announcement event. When Apple shares new iPhone model launch information to the market, the market perceives the event as a predictable annual product upgrade, and the information is already reflected in the price; for that reason, the event does not create any positive abnormal return. Usually, Apple announces the launch date of a new iPhone model in September. Investors reacted to its behavior prior to the event date, and after the announcement, the price dropped due to expectation correction, which supports the efficient market hypothesis. From each event's analysis, an abnormal return opportunity is generated in a short window before the event date, and after the event date, the abnormal return becomes negative. The abnormal return is negative due to the routine events. This behavior occurs due to market expectations and sometimes early leaks about a new product launch, which align with behavioral market theories. It is also consistent with the "buy the rumor, sell the news" effect. From the event figure analysis, the cumulative abnormal return is positive during the short window, rewarding Apple's strategy, but it quickly reverses. Some specific new-model iPhone announcement information exhibits positive cumulative abnormal returns across different windows. This behavior occurs when the announcement date is still September, meaning the information is predictable, but an abnormal return opportunity arises due to market sentiment, bullish market conditions, and other macroeconomic variables. Additionally, the new iPhone launch events enhance investors' confidence in Apple's strategy and realign expectations, leading to sustained excess returns. Sometimes the CAR becomes positive in the long window due to investors' expectation correction, post-event drift, and broader market effects. Surprisingly, the iPhone event was positive for CAR, but the result was not statistically significant, implying that unexpected innovation generates a favorable cumulative excess return.

Investors' reaction to Apple's announcement of the new iPhone is closely linked to their prior information and expectations. Unpredictable events convey new information to the market, generating a positive abnormal return, whereas predictable events' information is

already reflected in the stock price, indicating that the sell-the-news effect leads to a negative abnormal return. Overall, iPhone events appear to be predictable in the market, as the average abnormal return and the average cumulative abnormal return are negative. The significance test, Patell Z-test, sign test, and the robustness test of the CAR confirm that Apple's iPhone announcement events are anticipated, and the market reacts as "buy the rumor, sell the news," resulting in a negative abnormal return after the event information becomes available. When Apple's new iPhone announcement is perceived by the market as a routine or incremental upgrade, investors' expectations are disappointed, which negatively affects abnormal returns. As the negative abnormal return persists over a long horizon, the market does not reverse its initial reaction, as reflected in the product's market performance. This type of behavior is consistent with the semi-strong form of market efficiency theory. Therefore, Apple's new iPhone introduction events are no longer reliable signals for immediate positive abnormal returns.

6. Conclusion and Policy Implications

The study's findings show that the market reacts positively to unexpected news and negatively to anticipated news. Apple's new iPhone launch events generated a negative cumulative abnormal return because investors perceived them as predictable. Before the event date, the abnormal return was positive and then disappeared very soon. The market reaction to Apple's new iPhone introduction events is perceived as predictable. The study's findings confirm that most iPhone launch events are predictable to investors and that the market was not surprised by the introduction of the new iPhone. The market reaction to those events, with profit-taking, results in negative abnormal returns. The market's daily reaction is weak; as a result, it shows mixed abnormal returns; however, the cumulative effect is statistically significant and meaningful, consistent with expectations. Overall, Apple's stock performance at each iPhone event is initially neutral and slightly negative, but in the medium- and long-term post-announcement windows, the abnormal return becomes consistently negative. So, the market provides the negative cumulative abnormal return due to the "buy the rumor, sell the news" effect. The market consistently treats Apple's iPhone events as expected and information-neutral, and the price reflects this, consistent with the semi-strong form of market efficiency theory. The study results suggest that investors buy Apple stock before the new iPhone announcement and sell it afterward because the event falls short of expectations. Therefore, the findings show that Apple's introduction of the new iPhone model does not create short-term shareholder value, as evidenced by a significant decline in cumulative abnormal returns.

Apple should focus on market expectations, innovation, surprising events, and competitive advantage to sustain its position in the competitive market, as its iPhone announcement events generate negative cumulative excess returns. To signal the market, announce new information that generates comparative advantages; otherwise, the information can result in a negative return. A strong market environment can create a positive excess return event if the event is predictable. Favorable market sentiment can enhance investor optimism and benefit from the product life cycle and auspicious macroeconomic conditions. So, to send a positive signal to the market, Apple should consider an innovative technological breakthrough strategy and the market's favorable timing for launching new event information. For investors, those

focusing solely on the immediate aftermath of an event may miss out on long-term gains that align with Apple's consistent innovation and strong market position. These events serve as catalysts for sustained, positive excess returns in the long run as the market assesses actual product demand and sales performance. Further research can be conducted on market timing, macroeconomic conditions, and the market sentiment surrounding Apple's announcement of its new iPhone. Additionally, future research can examine other types of new product announcements by Apple Inc., as well as investors' sentiment analysis within the broader technology industry, and artificial intelligence-based forecasting to determine the excess-return opportunity in capital markets.

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