# Comparative Analysis of Preannouncement Effect of New Products and Market Reaction

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**Abstract**

This study used the launch date of new iPhone products by Apple over the years and contrasts them as the reference point with the new smart phones of HTC, LG, Samsung, Nokia, Sony, and Motorola. With the yearly release date of Apple's new iPhone products as the benchmark, difference analysis in abnormal returns was conducted among the phone products of various brand manufacturers released around than iPhone launches during 2007 to 2017. Previous study showed that Apple brand loyalty is the highest, consumers' intention to purchase the new flagship mobile phones of other brands will decrease. In consequence, there are significantly positive abnormal returns prior to the selling of new mobile phones in the first week, but after the selling day, they turn into negative abnormal returns. Furthermore, the new mobile phones declared to be released after the iPhone released continuously have positive abnormal returns.

*Keywords:* Smartphone, event study, abnormal returns, iPhone, new product.

## 1. Introduction

As current technology witnesses progress by leaps and bounds, outdated technology products gradually cannot meet consumers' needs. Thanks to the appearance of the first mobile phone in the 20th century, users can use this communication tool whenever and wherever possible without geographic restrictions, and its shape, size, and functions are constantly being upgraded. In terms of operational interface, the traditional touch-tone interface has developed into the current touch interface. In terms of function, the pure communication function has developed into the functions of taking pictures and sending photos, and later on networks and APPs have combined to adapt to the increasingly quickening life pace. Mobile phones have become an information transfer medium. In the current era of information explosion, it is extremely important to catch hold of new information. Therefore, smartphones have gradually built up an unshakeable position in people's lives. The first iPhone launched by Apple in 2007 was like a stun grenade thrown at the traditional mobile phone industry. From then on, the mobile phone market entered a new era.

Various smartphone manufacturers have invested a large amount of capital in this new blue ocean in preparation to seize market share. Kotler [26] indicated that in order to survive, enterprises must maintain their innovation advantage to improve consumer cognition value and brand loyalty. Therefore, various types of appearance moldings, special functions, and software interface designs are the touchstones for testing the strength of mobile phone manufacturers, such as the screen and CPU of Samsung, the grip pressure induction of HTC, and the IOS system of Apple. Shurmer [41] and Young and Rubicam [48] found that the technological products used by most peers will make young customer want to possess them and easily cause impulse buying behavior among them. According to the social comparison theory (see Festinger [17]), customer tend to compare with others in the choices they make. Therefore, the products bought by others will further affect the buying behavior of other consumers.

Current related studies are mostly limited to the stock price changes of Apple's vertical supply chain firms. Therefore, this study applied multiple non-Apple mobile phone manufacturers to analyze their stock prices on the day when their new mobile phones came onto the market to further observe the effect on stock returns when these non-Apple enterprises launch new products before or after the launch of a new iPhone each year (see Robertson [36], Wang et al. [46]). Grossman [18] proposed the rational expectations theory and considered that when new information that a company will launch a new product enters the market, the original stock price will produce a new price through rational expectations. Both the new information and the new product declare to shareholders and market traders that the enterprise will have an opportunity for new growth, causing investors to reappraise the company's future profitability or value. Thus, the stock price will change to further produce abnormal returns (see Jones et al. [21]).

Porter [33] proposed the theory of competitive advantage, which mainly emphasizes that innovation has become the important factor for enterprises to enter and lead competitors to further improve their competitive advantage in the market. Past studies indicated that there will be a positive market response when enterprises launch new products (see Woolridge and Snow [47], Kao et al. [22]). This finding is consistent with those of Chaney and Devinney [5] and Kao et al. [22] supports that the launch of a new product will give the product launch company positive returns, and at the same time its effect is also reflected pm other industrial competitors to further produce negative and significant excess returns.

Due to the rapid breakthrough in smartphone technology, manufacturers have transferred capital and R& D direction to this industry, so as to promote enterprises to pursue profits as well as to positively invest and operate in relevant software technology to further improve enterprise competitiveness. Thus, it will make market investors affirm the positive effect of IT investment on company value (see Hayes et al. [19], Dehning and Richardson [10], Otim et al. [31], Roztocki and Weistroffer [38]). At present, the literature has rarely discussed whether it is more favorable for non-Apple enterprises to launch their competing product before or after an iPhone launch. Based on the efficient market hypothesis, this study applied event study to represent the market response that

is reflecting market information. Thus, the information declared and provided by the company to market participants will be reflected in the market price (see Konchitchki and OLeary [25]).

Specifically, this work investigates how the market reflects the effect on stock returns when non-Apple enterprises launch their new products before or after the launch of new iPhone products. The remainder of this study is organized as follows. Section 1 is the preface and defines the study issue. Section 2 summarizes the relevant literature review. Next, Section 3 is the study method and uses the event study to discuss how the market responds. Section 4 is the empirical result and analysis, and the final section presents the conclusion.

## 2. Literature Review

The word "smartphone" was defined by Microsoft at the very start, and it refers to a mobile phone concurrently having the functions of call making and PDA (Personal Digital Assistant). Zheng and NI [49] found that in addition to the traditional voice call functions, the smartphone also needs to be equipped with functions to provide information management and wireless Internet access, and it is like a small computer. Chang, Chen and Zhou [6] considered that a smartphone is a combination of a general mobile phone and PDA, and it is positioned as a substitute for a laptop and PDA. This study defined the Apple and non-Apple smartphone products by the difference in their built-in operational system, they are the IOS system exclusive to Apple and Android system used by non-Apple products.

According to Hsu et al., [20], the period from 2006 to 2008 is the "start-up stage" of smartphones, and from 2009 to 2012 is the "explosive growth stage" of smartphones. In the global smartphone market, smartphones have developed at the fastest speed. So far, most studies are related to the industry chain and analyze the stock prices of Apple supply chain firms as the principle axis. Their fluctuations are easily affected by iPhone productivity and sales, and so this present study took the released date of new smartphones of other brands as the samples to analyze their stock prices.

When consumers choose to purchase new products, their past memory and used experiences will affect their purchase decision. Rao and Monroe [35] also found that commodity knowledge will affect consumers' commodity appraisal. Farquhar [16] emphasized the added value of the brand and noted that the brand is the name, symbol, design, or mark that is used to further intensify the added value of the product in itself. Therefore, brand is not only the name or symbol, but also the brand design can also facilitate consumers to identify and convey its added value. Keller [23] observed that the selection of the correct brand name can strengthen brand popularity and create brand image, and that the brand name can convey information related to the product to consumers. In regard to horizontal competition, Aaker [1] stated that brand is adopted to confirm the product provided by manufacturers as well as to distinguish itself apart from competitors. Armstrong and Kotler [27] posit that the brand differs in the rights and values possessed in the market, and a brand having stronger competitive power and

higher popularity will have higher brand equity. Consumers queue up to buy an iPhone after the launch of a new model, and so consumers exhibit that it has higher brand loyalty and market share. Thus, the launch date of the yearly new iPhone was used as the control sample in this paper.

## 3. Research Design and Methodology

### 3.1. Data Collection

This study adopted event study to discuss stock returns when non-Apple products are launched before or after the launch of new Apple products. Event study is generally applied to define whether there has been any information effect on the stock performance around the announcement date in different events (see Ramchander et al. [34], Pantzalis et al. [32]). This study took the internationally well-known listed and OTC mobile phone manufacturers as the subjects. Research samples of new flagship phones were collected from the Phone Arena (official website: https://www.phonearena.com/), and the launch of research samples were chosen from Samsung, LG, Motorola, HTC, and Sony during the period from 2007 to 2017. According to the selection condition, the samples should be the flagship phones for that specific year and be on the same level with the iPhone control samples, and the announcement date of all research events was verified by the United Daily News database (UDN database). (see Wang et al. [45]).

### 3.2. Event study methodology

Fama [14] was the earliest to propose event study, and from then on this method has been widely applied to different events to evaluate the abnormal returns during the period of the event. Event study has been used in various different fields (see Chen et al. [7], Sood and Tellis [43]), including E-commerce, (see Subramani and Walden [44]), strategic alliance (see Das and Sengupta [9]), earnings announcement (see MacKinlay [30]), and new product launch (see Bayus and Rao [2]). Son et al. [42] provided a method for market participants to evaluate the change in stock prices, and it can be used to test whether the occurrence of an event will cause an abnormal change in the stock price of one enterprise to cause abnormal returns (AR). Results can help one understand whether stock prices can reflect the information brought by one event rapidly and directly and to discuss whether the market is efficient (see Fama et al. [15], Denis and Kruse [13], Demirer and Kutan [12]). In the past, relevant literature has adopted event studies to discuss relevant issues (see Dehning, Richardson and Zmud [11], Roztochi and Weistroffer [37]).

Sharpe [39] used a market model where it was supposed that the rate of return of various kinds of securities only has a linear relation with the mutual relationship among returns in a market portfolio (see Brown and Warner [4]). This model is denoted by a linear model in Eq. (3.1):

$$E(r_{it}) = a_i + b_i(R_{mt}) + \mu_{it} \qquad (3.1)$$

Where $E(r_{it})$ is the return of the stock $i$ on day $t$; $R_{mt}$ is the return of the stock market in the day $t$; $a_i$ is the fixed item of the market model; $b_i$ is the systematic risk, and $\mu_{it}$ is the stochastic error term in the day $t$. According to Scholes and Williams [38], this study applied the Scholes-Williams OLS risk adjustment model to adjust the study samples in order to reduce the abnormal transactions incurred by transactions or non-synchronous transactions, causing the risk coefficient to be underestimated (overestimated), so as to test how the stock market responds to new-pattern products declared and imported. The Scholes-Williams beta is shown in Eq. (3.2)

$$\hat{b}_i^* = \frac{\hat{b}_i^{\ominus} + \hat{b}_i + b_i^{\oplus}}{1 + 2\hat{P}_m} \tag{3.2}$$

where $b_i^{\ominus}$ ($b_i^{\oplus}$) is the least square estimators of the individual stock returns and the market returns in the earlier (later) period; and $\rho_m$ is the autocorrelation coefficient of market returns.

Abnormal returns, $AR_{it} = r_{it} - E(r_{it})$, represent the difference between the historical stock return and the expected return, and the calculation of average abnormal returns $(\overline{AR_t})$ is as follows:

$$\overline{AR_t} = \frac{1}{N} \sum_{i=1}^{N} AR_{it}. \tag{3.3}$$

## 4. Sample Descriptions and Empirical Results

This study conducted the sample descriptions and empirical analysis. First, the samples were introduced in order and explained. Second, the effects of pre-iPhone and post-iPhone launches on the abnormal returns of stock prices are discussed. This study took Samsung, LG, HTC, Motorola, and Sony during the period from January 1, 2007 to December 31, 2017 (a total of 10 years) as the subjects the released day data took from Phone Arena, and the stock price data of study samples were taken from the Taiwan Economic Journal database and Yahoo Finance. The launch dates of various iPhones were first confirmed, and then the launch dates of each product of the 5 companies every year were ranked according to pre-iPhone and post-iPhone launches (see Lin et al. [29]). Table 1 and 2 show the situation of launch dates of various mobile phones.

The empirical results in Panel A (Table 3) found that there is significantly positive abnormal returns for day -5 and -11 (the fifth day and eleventh day before the announcement date) in pre-iPhone launch; there are significantly negative abnormal returns, -0.007, -0.10 and -0.005 for day -12, 7 and 10, respectively. In Panel B, abnormal returns of new mobile also reported significantly negative announcement effect for day -14, -13, 7 and 2, respectively. Manufacturers typically announce new product launches prior to the iPhone launch. Before the announcement, there is an obviously positive abnormal returns, and it continues until the first week after the announcement; in the

Table 1: Pre-iPhone released.

| Company | Release day | Company | Release day |
|---------|-------------|---------|-------------|
| MOTO | 2007/5/15 | SONY | 2014/3/24 |
| HTC | 2007/6/5 | HTC | 2014/3/25 |
| LG | 2008/5/3 | SAMSUNG | 2014/3/27 |
| SONY | 2009/6/5 | LG | 2014/5/28 |
| SONY | 2010/3/25 | MOTO | 2014/8/29 |
| HTC | 2010/3/31 | SAMSUNG | 2015/4/10 |
| LG | 2011/3/7 | LG | 2015/4/29 |
| SONY | 2011/4/1 | HTC | 2015/5/29 |
| HTC | 2011/5/19 | SAMSUNG | 2015/8/21 |
| SAMSUNG | 2011/4/28 | MOTO | 2015/9/3 |
| MOTO | 2011/7/7 | SAMSUNG | 2016/3/11 |
| MOTO | 2012/2/10 | LG | 2016/4/23 |
| HTC | 2012/3/30 | SAMSUNG | 2016/8/19 |
| SAMSUNG | 2012/5/22 | MOTO | 2016/9/1 |
| SONY | 2012/9/25 | LG | 2017/4/7 |
| SONY | 2013/2/9 | SAMSUNG | 2017/4/21 |
| HTC | 2013/2/19 | SONY | 2017/6/1 |
| SAMSUNG | 2013/4/25 | MOTO | 2017/8/10 |
| MOTO | 2013/8/23 | SAMSUNG | 2017/9/15 |
| LG | 2013/9/13 | HTC | 2017/11/2 |

Table 2: Post-iPhone released.

| Company | Release day | Company | Release day |
|---------|-------------|---------|-------------|
| SONY | 2007/10/22 | MOTO | 2010/8/11 |
| LG | 2007/11/7 | LG | 2010/9/14 |
| SAMSUNG | 2007/11/22 | SAMSUNG | 2010/6/28 |
| HTC | 2008/9/23 | SAMSUNG | 2011/11/10 |
| SONY | 2008/9/30 | SAMSUNG | 2012/10/11 |
| SAMSUNG | 2008/9/30 | LG | 2012/11/2 |
| MOTO | 2008/12/12 | SAMSUNG | 2013/10/29 |
| LG | 2009/7/7 | SONY | 2015/11/5 |
| HTC | 2009/10/20 | HTC | 2016/4/12 |
| MOTO | 2009/11/5 | SONY | 2016/10/2 |
| SAMSUNG | 2009/12/23 | | |

second week, it turns into a negative abnormal returns. In addition, if the manufacturers announce the new product launch after the iPhone launch, then there will be a

Table 3: Abnormal Returns of Pre-iPhone & Post-iPhone released.

Panel A. Pre-iPhone Released

| Period | ARs | | $t$-value | Period | ARs | | $t$-value |
|---|---|---|---|---|---|---|---|
| -15 | -0.004 | | -0.999 | 1 | -0.004 | | -1.403 |
| -14 | -0.002 | | -0.578 | 2 | 0.001 | | 0.495 |
| -13 | 0.003 | | 1.457 | 3 | -0.004 | | -1.266 |
| -12 | -0.007 | ** | -2.132 | 4 | 0.003 | | 1.385 |
| -11 | 0.005 | * | 1.653 | 5 | 0.001 | | 0.359 |
| -10 | 0.005 | | 1.464 | 6 | -0.004 | | -1.121 |
| -9 | -0.001 | | -0.339 | 7 | -0.010 | *** | -3.364 |
| -8 | -0.002 | | -0.745 | 8 | -0.001 | | -0.380 |
| -7 | 0.001 | | 0.282 | 9 | 0.013 | | 0.946 |
| -6 | -0.002 | | -1.096 | 10 | -0.005 | ** | -2.187 |
| -5 | 0.007 | ** | 2.002 | 11 | 0.003 | | 0.571 |
| -4 | -0.001 | | -0.429 | 12 | 0.000 | | 0.156 |
| -3 | -0.003 | | -0.797 | 13 | 0.131 | | 0.985 |
| -2 | 0.003 | | 1.072 | 14 | 0.001 | | 0.336 |
| -1 | -0.002 | | -0.534 | 15 | -0.020 | | -1.180 |
| 0 | 0.001 | | 0.483 | | | | |

Panel B. Post-iPhone Released

| Period | ARs | | $t$-value | Period | ARs | | $t$-value |
|---|---|---|---|---|---|---|---|
| -15 | 0.004 | | 0.752 | 1 | 0.003 | | 0.785 |
| -14 | -0.007 | * | -1.719 | 2 | -0.014 | *** | -3.473 |
| -13 | -0.011 | * | -1.696 | 3 | -0.005 | | -0.889 |
| -12 | 0.004 | | 0.514 | 4 | 0.003 | | 0.569 |
| -11 | 0.004 | | 0.935 | 5 | 0.007 | | 1.426 |
| -10 | 0.002 | | 0.603 | 6 | -0.007 | | -1.118 |
| -9 | 0.002 | | 0.357 | 7 | 0.003 | | 0.720 |
| -8 | 0.005 | | 1.322 | 8 | 0.003 | | 0.478 |
| -7 | -0.008 | * | -1.957 | 9 | -0.002 | | -0.631 |
| -6 | -0.001 | | -0.122 | 10 | -0.002 | | -0.342 |
| -5 | 0.004 | | 0.664 | 11 | 0.000 | | -0.021 |
| -4 | 0.001 | | 0.223 | 12 | 0.003 | | 0.654 |
| -3 | -0.003 | | -0.471 | 13 | -0.002 | | -0.385 |
| -2 | -0.001 | | -0.259 | 14 | 0.002 | | 0.384 |
| -1 | 0.001 | | 0.252 | 15 | 0.004 | | 0.958 |
| 0 | -0.002 | | -0.436 | | | | |

Notes: *** denotes statistical significance at 1% level; ** denotes statistical significance at 5%; * denotes statistical significance at 10%.

significantly negative abnormal returns continuously.

In Table 4, there are significantly negative cumulative abnormal returns over the (0,
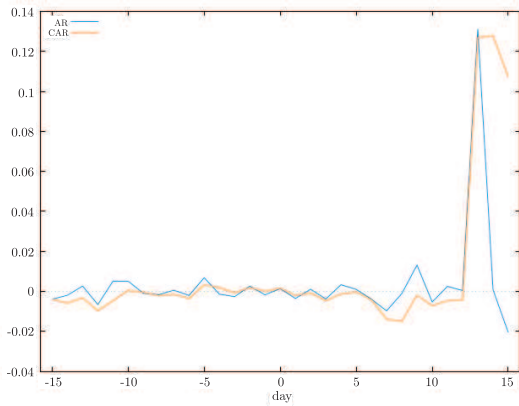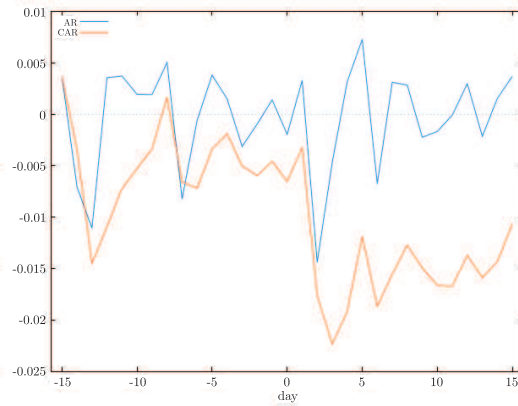
Figure 1: AR & CAR of Pre-iPhone.



Figure 2: AR & CAR of post-iPhone.

Table 4: Cumulative Abnormal Returns of Pre and Post-iPhone released.

| Pre-iPhone released | | Post-iPhone released | |
|---|---|---|---|
| CAR | $t$-value | CAR | $t$-value |
| -0.002 *** | -6.793 | 0.001 ** | 2.177 |
| -0.004 ** | -2.307 | 0.003 | -0.574 |
| -0.014 ** | -2.289 | -0.011 | -1.513 |
| -0.016 ** | -2.180 | 0.010 * | -1.893 |

Notes: *** denotes statistical significance at 1% level; ** denotes statistical
significance at 5%; * denotes statistical significance at 10%.

1), (-1, 1), (0, 7) and (-1, 7) in pre-iPhone windows. Conversely, obviously CARs ((0, 1)
and (-1, 7)) indicated positively cumulative information effects are clustered around the
pre-iPhone windows. This study overall believes that manufacturers should launch new
products before the new iPhone products are sold every year. The date to launch a new
iPhone every year is close to Q3, and previous studies have shown that Apple's brand
loyalty is the highest; thus, consumers' intention to purchase the mobile phones of other
brands will decrease. As a result, there are significantly positive abnormal returns prior
to the selling of new mobile phones in the first week. However, after the selling day, it
turns into negative abnormal returns. The new mobile phones declared to be launched
after the iPhone launch will then continuously have obviously negative abnormal returns.

## 5. Conclusions

The new mobile phones that are launched each year are always highly expected by
consumers, who hope that new mobile phone for that year offers significant convenience
and innovation. The new mobile phone launch held by Apple in each autumn attracts

tens of thousands of iPhone fans to stay up watching the live show, because they want to know the selling day and the innovative functions of the new product. However, competing manufacturers also adopt novel tricks to promote their mobile phones (see Lee et al. [28]). According to this study, better abnormal returns can be achieved when a new product is sold before the launch of the yearly new iPhone product; at the same time, most investors are optimistic about related stock prices in the supply chain prior to the first selling day, and so their stock prices gradually increase prior to that day. They then turn into negative abnormal returns until the 7th day after the event day, and their significant level is better compared with the post-iPhone launch.

This study notes that new products for a specific year are worse than consumers' expectation. For instance, Samsung's new Galaxy S6 and Note 5 sales in 2015 lost to Apple's new model and China's mobile phone, the share price has dropped 13% this year, the market value of evaporation of about 22 billion US dollars after Apple launched the new product at 0:00 on September 10, 2015 in Taiwan, Apple's stock price in the U.S. did not benefit a lot from it. On the contrary, it declined nearly 2%. At the same time, it also impacted Taiwanese shares as well as the performances of Apple's supply chain firm on that day. The new products of iPhone 6s and 4-inch iPhone SE on June 4, 2016 exhibited the poor sales. The above-mentioned of information show that a new iPhone does not always play the leading role in the mobile phone market, and that other manufacturers should enhance its own characteristics in a rapidly replacing the mobile phone market to stable market share.

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