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Invited Article

# A Guide to Event Study Methodology: Perspectives and Applications in Business Market Research

Bilal Khalid[1*]

## Abstract

This study presents a comprehensive methodological analysis of the model specifications, analysis process, and market application of event study. The study focused on technique's efficacy in business performance research. Event studies are widely utilized for assessing the impact of specific business and management events, such as earnings announcements, mergers, and regulatory changes, on stock prices, providing a quantitative measure of market reactions. This study demonstrated a step-by-step process of conducting an event study by applying the Capital Asset Pricing Model (CAPM). The relevant event windows and data analysis process are discussed. This study reviews key applications of event studies in business research, highlighting their role in testing market efficiency, understanding investor behavior, and evaluating firm-specific events' economic impact. Highlighted key applications include analyzing effects of business events such as earnings, dividends, and mergers announcements; testing market efficiency; studying investors' behavior; and risk-return analysis. Some limitations of event study heighted include issues with model dependence, selection biases, and the challenges of accurately defining estimation and event windows. This study proposes the need for refining event study methodologies, emphasizing the potential of advanced econometrics, machine learning, and behavioral finance integration.

**Keywords:** Event study, Business research, Methodological perspective, Market research, Event window

## Introduction

Business management and economic events have effects on the value of firms. While it may be difficult on the face to determine the effect of a business event on the value of the firm, the measure of change can be constructed through the event study. The concept of event study, thus, involves the measure of the impact of specific events on the value of the firm, including

[1] Assistant Professor, KMITL Business School, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

* Corresponding Author e-mail: bilal.kh@kmitl.ac.th

voluntary firm announcements, such as new product announcements, dividends, mergers, and acquisitions, or actions of competitors, such as entry of new firms to the market. The idea of event study was first explained in the study by Ball and Brown, which examined the reaction of the markets to unexpected earnings numbers (Eden et al., 2022; Ohlson, 1991). The concept of event study was further explained in the research by McKinlay (1999), which used data from the financial markets to determine the impact of events on the value of the securities. The study indicated the likelihood of abnormal returns during the date of the event.

The idea for the concept of event study came into business and economic research because self-dynamics of firms' historical data is frequently analyzed in order to find out how significant events affect the value of the stocks of given company. The significance of the Kosovo War to the stocks of defense industry in NATO countries in 2002, was examined by Ateş (2002). Finally, the results revealed a dramatic change in abnormal returns of US defense stocks and European defense stocks. The event study methodology has been applied in the area of business performance analysis as part of business specific events of the events as well as the economy wide events like business mergers and acquisition that allow for determining the effect of events on an organization's future value (Tavor & Teitler-Regev, 2024).

**Event Study in Market Research**

Event study methodology continues to play a significant role in business market research due to the ability to analyze the impact of events on the market by determining changes to demand and supply. Wiles and Danielova (2009) articulate that event studies are critical in business market research since they can offer timely insights into the influences of external events on various aspects of the market. For example, stock prices are some of the market parts that market events influence. The stock prices of business organizations are affected by various business events which then lead to making timely and accurate decisions to influence the company's stock market valuation (He, 2021; Tsang et al., 2024). Also, stock market reactions to such specific organizational decisions like acquisitions and mergers occur. Event study methodology can reveal the value impact of different events and allow investors to take informed decisions on the way the stock market goes about.

In addition, the concept of event study also serves to find out how market events influence consumer behavior. To business organizations, understanding consumer behavior is important since it is a way of knowing how to formulate better products and services for the success of more sales. Marketing strategies can influence consumer behavior. Therefore, businesses can develop marketing strategies which influence the consumer perception and purchasing behavior (Kim, 2020) and can reap the advantages from the impact of external events on consumer behavior. Event studies, for example, can be used to test before using celebrity endorsement marketing strategies, to see which will influence consumer behavior. Event studies also have a significant impact in understanding brand equity. Brand loyalty (Tahir et al., 2024) enhances sales by means of brand equity. Event study methodology could be used in a comprehensive analysis to determine the extent to which the impact from such external events, for instance sponsorships and scandals, on customer loyalty. The purpose of this study is to

develop a methodology for conducting event study in business market research. The study explores the literature backing event study, the models and techniques adopted and the practical applications of event study in business market research.

## Literature Review

### Historical Development of Event Study

Various research has in the past been conducted into the concept of event study methodology and its application in business and market performance research. Early research into event study methodology involved the study by Ball (2015) which hypothesized the relationship between stock splits, dividends and new information. The research was critical in the understanding of market reactions to new information, paving the way for future studies towards event study methods. Research advances in event study methodologies were also made in the 1980s, through the study by Brown and Warner on comparing different statistical methods and event studies (Brown, 1985). In the research, Brown and Warner demonstrated that event study methods could vary with time and have different influences on the companies' market performance. The comparison of the statistical properties of event study methods demonstrated its reliability. The study by Kothari and Warner (2007) involves research during the 1990s, that also addressed the use of event study methods underlining the challenges posed by long-horizon event studies. In the case of long-horizon events, the research emphasized the need to employ event study methods to avoid bias. The research contributed to the evolution of event studies by including the application of diversity when considering events such as those cutting across different fields including marketing, economics and politics. Recent studies on event methodologies include research by Miller (2023) which addressed the application of event studies on wider aspects including labour economics. The research underlines the versatile nature of the event study methods in accuracy and application.

### Application Across Fields of Study

Initially, the application of event study was majorly used in the business financial management field. However, advancement in this technique is making possible to be adopted and applied in other areas such as economics and corporate governance. As Edeling and Hanssens (2021) point, event study methods can be used in marketing to analyze the effect of different marketing interventions on the consumer behavior and product performance. For instance, marketing strategies such as advertising and discount events e.g. Black Friday will affect the manner one makes a purchase. By using event studies, marketers can use discount promotions to analyze the impact short term discount promotions can have on consumer behavior. Event study methods can be applied to the study of economic impacts of economic changes, such as economic policy changes or economic shocks (Clarke, 2021). As observed by Beccchetti et al. (2012), changes in governance can also be studied in the field of corporate governance with event

study methods. A change in the corporate governance often has impact on the various organizational aspects like shareholders, firm value and corporate behavior (Atugeba & Acquah Sam, 2024; Sarker & Hossain, 2024). Consequently, event study methods are important to understand the influence of corporate changes and their consequences for overall firm value.

**Methodological Challenges**

Researchers are faced with various challenges while adopting this technique, despite it being a common evaluation method. According to Eden et al. (2022), one of the major challenges when using event study methods is the data quality challenge. Quality if data is a critical aspect to consider, for any statistical analysis method. When working with data that may be incomplete, the maintaining of the integrity of data becomes a challenge for researchers. Event study tools also suffer from estimation windows problems. The choice of the estimation window affects accurate performance is critical, as Berens and Ziggel (2018) state. Issues exist with selecting a short or long estimation window which may or may not capture all the data or capture irrelevant data. Other challenges arise with the use of the event study tools in event definitions. In Sorescu and Ertekin (2017), they state that event definition is important to attain consistent results. Although the definition of dates of the event is correct, ambiguities in event definition make data collection ambiguous. For instance, determining the impact of a particular economic policy on consumer behavior requires the use of consumer data from the exact date the policy was announced.

Despite the role played by event study methods, various limitations exist in their applications. Data quality is among the limitations in the current application of event study methodology. McWilliams et al. (1999) articulate that data quality limitations include instances of inconsistent data sources and limitations to historical data. Often, researchers may incorporate varied data from different sources to attain results on events. However, inconsistent data from different sources may lead to unreliable outcomes affecting marketing decisions. Brav and Heaton (2015) observe that event study tools are also faced with statistical limitations. Like other statistical tools, event study tools require sample data and normal distributions to reach correct statistical outcomes. However, in the event of small sample sizes, the application of event study tools may lead to reduced statistical power impacting the study conclusion. Even so, there are various ways that the stage can be set for future contributions by addressing the limitations. For instance, Kothari and Warner (2007) observe that improving the integrity of the data used through data integration could help in enhancing the quality of data. Similarly, the use of advanced statistical methods is critical in attaining correct results from possible small sample data and non-normal data distributions.

## Methodology

This study is a methodological perspective that discusses the application of event study in business market research; drawing support for the method from various scholars (Albagli et al., 2024; Borusyak et al., 2024; Wang et al., 2024). The study is conducted from two perspectives: it discusses the empirical data analysis techniques used in the event study and the business application scenarios of the event study. The study presents empirical data analysis in the data analysis section and the areas of application in the discussion section.

The event analysis is analyzed using three specific event periods – estimation window, event window, and post-event window (Figure 1). The window periods are discussed as follows.
Estimation window: the estimation window provides the information needed to specify the 'normal return'. It is the period before the event window used to estimate the normal or expected return of the stock. Often 100–250 trading days prior to the event. A longer estimation window can yield more stable estimates.

**Event window:** The event window is the period during which the event is expected to influence the stock's price. This window captures the events immediately before and after the event.

It focuses on short-term reactions in the market, aiming to measure abnormal returns caused by the event. Depending on the nature of the event, it can be short (e.g., t = − 1 to t = + 1) or extended period (e.g., t = − 5 to t = + 5).

**Post-event window:** The post-event window is the period following the event window. Researchers can see if the event affects stock prices. It tells how the market response is temporary to find out how this event affected the market. The length of the period depends upon how long an event is expected to last, from a week or two to several weeks to months or more after the event window.

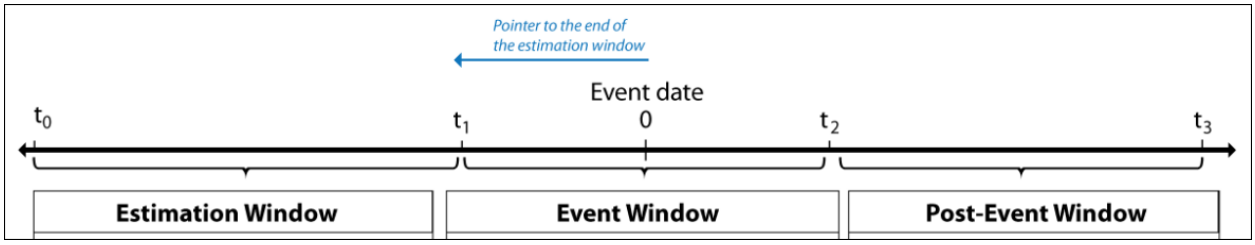


**Figure 1** Event Windows periods

An event study is a statistical method used to evaluate the effect of a specific event, such as product launches, policy changes, or earnings announcements, on the value of a company's stock prices or other financial indicators.

The ability to determine the effect of a specific event is enabled by the Efficient Market Hypothesis theory, which suggests that capital markets reflect all available information about firms in the firms' stock prices (Clarke & Tapia-Schythe, 2021).

## Event Study Data Analysis

The methodology involves measuring the abnormal returns of prices around the event date to determine whether the event had a statistically significant effect on the stock's value. In the following section, we discuss the step-by-step process of conducting an event study.

### Determining the Event and Event Window

The first step is determining the event to analyze. For instance, in the stock prices, an event could be a new manager, product launch, dividend announcement, policy change etc. The next step is setting up the Event Date (t=0), where the date of the event is set to time t=0.

Then, the Event Widow is determined, which captures the period of market reaction. The event window could range from a short window (e.g. -1 to +1 days) to a longer period (e.g., -20 to +20 days). This could be coded as:

- Short term: [t-1,t+1]
- Long term: [t-20,t+20]

### Defining the Estimation Window

The estimation window implies the period before the event window, which is used to calculate the expected return model parameters. The estimation window ranges from 100 to 250 trading days before the event.

For instance, if the event data is set to be t=0,

The estimation window would be: [t-120,t-20]

NB: the estimation window excludes the event period to prevent the event from biasing the model estimation.

### Data Collection

The next step is data collection. This depends on the type of event being researched. Suppose the study investigates the effect of an event on new manager, stock prices, or acquisition plan. The appropriate data to use for the company would be its stock price data, where the daily closing prices could be used. Then, the market index data is collected, where daily closing prices for a market index (e.g., S&P 500) represent the overall market returns. The last data collected is the risk-free rate, where the daily or monthly data for the risk-free rate could be used.

**Calculation of Dairy Returns and CAPM Parameters**

The daily returns of the stock $R_{i.t}$ and the market $R_{m.t}$ during the estimation window and event windows are now calculated. The model is specified as follows:

$$R_{i.t} \frac{P_{i.t} - R_{i.t-1}}{P_{i.t-1}}$$

$$R_{m.t} \frac{M_{t} - M_{t-1}}{M_{t-1}}$$

Where:

$P_{i.t}$ = are the stock prices on day t

$P_{i.t-1}$ = are the stock prices on day t -1

$M_t$ = the market index values on day t

$M_{t-1}$ = the market index values on day t-1

With the application of the Capital Asset Pricing Model (CAPM) the stock's expected return are estimated on the estimation window. The CAPM model specification is put as follows:

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

Where:

$\alpha_i$ = the intercept

$\beta_i$ = stock's sensitivity to market movements

$R_{i.t}$ = the return of the stock on day t

$R_{m.t}$ = return of the market index on day t.

$\epsilon_{i.t}$ = error term (residual)

**Expected Returns and Abnormal Returns**

The expected return is calculated using the estimated CAPM parameters for each day in the event window. The following model for expected return is adopted:

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

The Abnormal Return (AR) is calculated by subtracting the expected return from the actual return for each day in the event window.

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

**Cumulative Abnormal Returns (CAR)**

The cumulative abnormal return sums the abnormal returns over a specified event window to capture the total impact of the event. Cumulative Abnormal Return (CAR) is specified as follows:

$$CAR_{i(t1,t2)} = \sum_{t=t1}^{t2} AR_{i,t}$$

Where [t1, t2] represents the start and end dates of the event window (e.g., from t−50 to t+50).

**Statistical Tests**

The last step is conducting a statistical test, which would determine the significance of abnormal returns (AR) and cumulative abnormal returns (CAR). Standard tests include the t-test, which checks if the average abnormal returns are significantly different from zero. These tests are specified below:

**T-test for AR:** In this test, each day in the event window, the test of whether the mean abnormal return is significantly different from zero is carried out:

$$t = \frac{\overline{AR}_t}{\sigma(AR_t)/\sqrt{N}}$$

Where $\sigma(AR_t)$ is the standard deviation of abnormal returns on day t and N is the number of observations.

**T-test for CAR:** It is conducted to test whether the cumulative abnormal return $CAR_i$ over the event window is significantly different from zero:

$$t = \frac{CAR_i}{\sigma(CAR_t)/\sqrt{N}}$$

In the interpretation of results, the following criteria should be adopted:

- **Positive CAR:** event had a positive impact on stock returns
- **Negative CAR:** the event had a negative impact on stock returns
- **Statistical significance:** If the abnormal returns are statistically significant, it implies that the market reacted to the event. The interpretation should be done based on the size and direction of the CAR based on economic and market context.

These models provide a comprehensive framework for conducting an event study, allowing researchers to assess the impact of events on stock prices accurately.

## Application of Event Study in Finance

Event study has proved to play a critical role in business market performance research. It provides financial insights into how the market reacts to various business and economic related events. Traditionally, event studies have been applied to measure the effects of earnings announcements, mergers and acquisitions, regulatory changes, and other firm-specific or macroeconomic events on a company's value, such as stock prices (Wells, 2004). Their widespread use stems from their ability to offer empirical evidence on market efficiency and investor behavior (Fama, 1970).

The most adopted model in the event study is the Capital Asset Pricing Model (CAPM). In CAPM, the abnormal returns (ARs) are used around the event period. The event studies allow researchers to assess whether the event created significant market reactions (Brown & Warner, 1985).

Different key business and market events could adopt event study techniques that were evaluated. The first include the earning announcements, which are usually released quarterly, or annual earnings provide key performance indicators about a firm's financial health. Other events include mergers and acquisitions, considered high-impact events in business performance. This is because they significantly alter the value of the company. Another event includes dividends and share repurchases. The Announcements of dividends and share buybacks can signal good company performance or strong cash flow, often leading to positive abnormal returns. Other events include regulatory changes in the business markets such as tax reforms and deregulations the environmental, social and governance announcements (Borusyak et al., 2024). From the previous research, the event study has demonstrated significant abnormal returns around mergers and acquisitions, suggesting that markets process the information rapidly, often aligning with the semi-strong form of market efficiency (Sun & Abraham, 2021).

In addition to business market research, event study is also applied to other studies such as environmental, social, and governance (ESG) finance. They are applied to evaluate how companies' environmental and social initiatives affect investor sentiment and company vaue changes. These non-business announcements also have significant effects on market performance through market reactions. Event study, therefore, helps to evaluate the firm's stock price reaction (Clarke & Tapia-Schythe, 2021). Macroeconomic announcements and crises, such as changes in interest rates, employment reports, and inflation data effects are also evaluated using event study. Event studies of these events focus on how new macroeconomic data affects market indices and asset classes.

Another major application of event study is the tests for business market efficiency. If markets are efficient, stock prices should be instantaneous and accurately reflect all information available. This hypothesis is tested through event studies which observe stock price reactions to new public information (Roth, 2022).

Apart from promoting business market efficiency, an event study is also used to examine the behavior of investor. As demonstrated in Borusyak et al. (2024), event study offers a glimpse into alternative investors psychology and behavior. Investors tend to overreact or underreact to events such as an unexpected CEO departure, product recall or lawsuit. This might be used to test the impact of the herding behavior, where the investors behave in a herd, without individual analysis.

## Conclusions

This study explored the application of the event study methodology, and the steps used in performing the technique. The study considers event studies as a comprehensive tool for evaluating market responses to various business events and happenings. The concept was found to be applicable in various areas, including management changes, new product announcements, dividends, mergers, and acquisitions, or competitor actions, such as the entry of new firms into the market. The technique is used to evaluate the impact of these changes on the firm's value. The event study evaluates the market behavior in response to business activity, from earnings announcements and mergers to regulatory shifts and ESG disclosures. This empirical measure provides insights into the reflection of new information in asset prices, acting as a crucial gauge of market efficiency and a window into investor behavior. However, the technique, despite being famous in evaluating event effects, it has some challenges and limitations. These limitations include model dependency, window selection, data availability, and market assumptions, all of which can impact the accuracy and interpretability of the results. Therefore, the development of future sophisticated models, which examine the impact of events on market behaviors, is guided by event studies. Future event studies could apply an integration technique for advanced econometric models, machine learning algorithms, and insights from behavioral market research. Conclusively, event study remains a cornerstone of business market research, with an adaptable framework that, when combined with contemporary advancements, holds immense potential for new areas of application.

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