African Research Journal of Education and Social Sciences, 7(2), 2020
ISSN (online): 2312-0134 | Website: www.arjess.org

# Event Studies in Finance: A review on the Methodological Approaches

Corresponding Author: Festus Kipyego Bett
Author Email: fekibe@amail.com

**Abstract**
*In recent years, the most frequently used tools in financial research is event study methodology. It was initially established as a statistical tool for empirical research in finance and accounting, but it has since been applied to other disciplines as well, including political science, law, history, economics and marketing. One of the main purposes of event studies in marketing is to evaluate any abnormalities or excess returns that have been received by security holders after engaging in certain events. In doing so, event studies examine how efficient the market is; they are often used to test the efficient market hypothesis which stipulates that the prices of assets give all available information. Despite how simple and standard event studies are, differences in methodology and their relative merits continue to stand out in the literature. This paper reviews methodological approaches in short and long-term event studies in finance. While short-term methods are straighter forward, for long term, any empirical model is still an empirical question. We conclude further empirical research on the latter models is necessary. Additionally, we claim that event studies should also consider fundamental analysis.*

***Keywords:*** *Event studies, Market Efficiency, Portfolio, Returns, Investment*

---

## 1. Introduction

With its origins dating back to 1930s and firstly well documented by De Jong & Naumovska (2016), an event study (ES) are a common method of research in finance. Event study typically tries to examine return behaviour for a sample of firms experiencing a common type of event (Getz & Page, 2016). The event that develops any type of impact on a firm's market value may or may not be within the firm's control. Despite its *prima facie* and conceptual ease, ES present some challenges.

The assessment of weather post event returns are abnormal is one of the most important and common challenges faced by researchers in finance (Bessembinder, 2019). In fact, one would only be able to discern abnormal returns if he/she knows what would have been (expected/ normal) in the absence of the event for the relevant period (event window). In this line, over the years, an overwhelming stream of literature proposing and improving methods were developed. Whilst short-term methodologies are straight forward and more reliable, the same does not hold true for long-term methods (Getz & Page, 2016). For instance, long-term same ES employing different methods yielded contradictory results unveiling, therefore, sensitiveness of outcomes to choice of model (Pernecky, 2016; Bessembinder, 2019). ES also pose additional challenges, about which extensive literature exist. These relate to statistical assumptions underlying the hypothesis testing procedures (e.g., normality) and the statistical properties of returns themselves

African Research Journal of Education and Social Sciences, 7(2), 2020
ISSN (online): 2312-0134 | Website: www.arjess.org

(e.g., event-induced variance, cross-section correlations, skewness), which affect the statistical and detection power of the tests (Lamond & Platt, 2016; Getz & Page, 2016).

Given the finding that social networking sites were popular among a large number of Daystar university students and that this can lead to depressive symptoms, parents and health stakeholders need to join forces to address this to avoid mental illness which may impact academic performance.

Consistently, the primary goal of this paper is to provide a brief critique review on the current methodological approaches used in ES in Finance, bringing to light the *state of affairs* and, most importantly, providing insights for further research. Given the complexity and extension of either expected returns estimation or statistical side of testing, we discuss only the key issues. In addition, finance researchers have devoted much attention to testing *market efficiency hypothesis* (long-term ES) in reaction to events such as IPOs and M&A, or testing speed of adjustment of stock prices to new information (short-term ES). Notwithstanding the importance of both, this paper focuses much more on the long-term ES mainly because they appear more unfinished and, therefore, controversial. However, this narrowing does not hinder the application of the insights therein to other horizons with the required cautions.

## 2. Event Studies in Finance: A review on the Methodological Approaches

This section covers the essence of event studies and methodological approaches employed in event studies

### 2.1 The Essence of Event Studies

De Jong & Naumovska (2016) documented the detailed procedure for carrying a typical ES. Accordingly, regardless of time horizon, abnormal return estimation follows the equation:

$$AR_{it} = R_{it} - E(R_{it}|x_i) \qquad \text{Eq. (1)}$$

Where, $AR_{ti}$ and $R_{it}$ refer to abnormal and normal returns form firm $i$ at time $t$ respectively. $E(R_{it}|x_i)$ indicates the expected return for the firm $i$ at time $t$ conditional on the event x to the respective firm. The latter right hand-side term from Eq. (2) is the unobservable return and, entails us to the first step, consisting of modelling expected returns. This constitutes a *sine qua non* step in ES, which we discuss in the following sections. The second step concerns testing whether estimated abnormal returns are statically significant. Depending on researcher's presuppositions about the returns distribution, tests may either be parametric (e.g., t tests, if normality is assumed) or non-parametric (Getz & Page, 2016).

Apart from event window span, Getz & Page (2016) provide two key differences between short and long-term ES. First, unlike long-term ES, short-term ES models are well specified and quite powerful. Secondly, in contrast to short-term, long-term ES are highly sensitive to assumptions and returns generating process.

African Research Journal of Education and Social Sciences, 7(2), 2020
ISSN (online): 2312-0134 | Website: www.arjess.org

On the other hand, both ES share similarities, and we here highlight two. The first one, brought to light by Lamond & Platt (2016) is *the induced variance challenge*. An important input when performing the traditional *t* statistic is a standard deviation. The intuition behind this challenge is that, the event-period return volatility is likely to exceed that during other periods. Therefore, statistical test would be inflated if historical volatility were used. Fortunately, for this issue non-parametric tests or corrected variances may be employed (Getz & Page2016). Secondly, all ES share the *joint-test problem*. As reported by Getz & Page (2016), this challenge hinges on the fact ES tests concomitantly test *whether abnormal returns are zero* and whether the underlying modelling of expected returns and testing assumptions are correct. To deal with this, simulation and analytical methods are followed by many researchers, whose description is laid down by (Lamond & Platt, 2016). The body of literature suggests that most of the methodological shortcomings and improvements are well known and so documented (Getz & Page, 2016; Pernecky, 2016; Spracklen & Lamond, 2016; Bessembinder, 2019).

### 2.1.1 Short-term Event Studies

As referred to previously, methodologies for short-term ES are more straightforward and less controversial (Getz & Page, 2016). The reason may be quite intuitive. In short-term, returns are not likely to experience significant changes, and therefore its prediction is less challenging.

Table 1
*Summary of Short-term Event Studies*

| **Method** | **Description** |
|---|---|
| Constant mean return | Returns are assumed constant over time, but differing across-companies, hence:$ER_{it} = \mu_i$. |
| Market model | Returns are assumed to be related to market (index) returns. Thus $ER_{it} = \alpha_i + \beta_i R_{m,t}$ Where *Rm* is a market index and subscripts *i* and *t* indicate event-firm and time respectively. |
| CAPM | Returns are associated to both risk-free return (*Rf*) and market return *Rm*. $[ER_{it} - R_{f,t} = \beta_i(R_{m,t} - R_{f,t})]$ |
| Free-factor model | It adds size and market-to-equity ratio to CAPM. [ $ER_{it} - R_{f,t} = \alpha_i + \beta_{1i}(R_{m,t} - R_{f,t}) + \beta_{2i}SLM_t + \beta_{3i}HLM_t$ ] SML: returns on small portfolio minus returns on big portfolio and HML returns on high (B/M) portfolio minus returns on low portfolio. Other factors can be easily added e.g., four and five-factors (Marshall, Nguyen & Visaltanachoti, 2019; Spracklen & Lamond, 2016). |

This table provides a brief summary of the main methodologies employed in short-run ES. Detailed discussion on each model is laid down in (De Jong & Naumovska, 2016; Spracklen & Lamond, 2016).

In fact, Ding Lam, Cheng & Zhou (2018) argue that even the simpler model (constant mean) does not yield results significantly different from those from models that are more sophisticated.

African Research Journal of Education and Social Sciences, 7(2), 2020
ISSN (online): 2312-0134 | Website: www.arjess.org

### 2.1.2 Long-term Event Studies

A cornerstone in long-term ES is associated with stock split study by (Henninger, 2018). Over the years, the market efficiency hypothesis (MEH), an underlying of asset pricing models, trading strategies and cost capital was put against evidence from increasing flow of studies showing abnormal returns in long-term (Liu, 2018). This evidence prompted the start of accumulation of ES devoted to testing MEH and emergence of finance field dedicate to modeling security pricing implications from investor's biased processing information, the behavioral finance (Getz & Page, 2016). The evidence on MEH is dissident. For instance, studies which applied different methods, *ceteris paribus*, came to contradictory results posing the important question of *which model is valid* (Bessembinder et al., 2019). Many people ascribed the abnormal returns to use of different methodology or misspecification problem (Pernecky, 2016; Henninger, 2018).

Table 2 provides a chronological summary of the main methodologies. The following subsection discusses about the summarized models.

African Research Journal of Education and Social Sciences, 7(2), 2020
ISSN (online): 2312-0134 | Website: www.arjess.org

Table 2
*Chronological summary of the main methodologies*

| Category | Methodology | Description |
|---|---|---|
| *Portfolio model* | Calendar Abnormal returns (CTAR) (Lamond & Platt, 2016) | CTAR focuses on the mean abnormal time series returns to a portfolio of event firms. A researcher should construct a portfolio of event firms for each calendar month for the full relevant period (rebalancing where required) and compute the respective returns. The excess returns are then calibrated whether they are abnormal in a multifactor e.g., CAPM, (Lamond & Platt, 2016). The intercept from the regression measures post event abnormal returns. Key distinctive features of its non-requirement for construction of benchmark firms and that the returns are time arithmetic mean. |
| *Benchmark firm models* | Buy-and-hold returns (BHAR) (Schimmer, 2018). | BHAR method builds on the difference between the return to event firms (firms undergoing the event of interest) compared with that to control firms (benchmark firms). Benchmark firms selection grounds on size and market-to-book ratio. In contrast to CTAR, BHAR uses compounded returns (geometric mean). |
| | Augmented BHAR (Pernecky, 2016). | It is an extension of BHAR model. However, the abnormal returns obtained from standard BHAR are regressed (OLS) on a constant and a set of seven firm-characteristics (differences between event and control) that may explain the differences across event and non-event firms, namely: market beta, book value, momentum, illiquidity, idiosyncratic volatility and investments. The abnormal returns according to this model are measured by the regression constant. |
| | "Enhanced" augmented BHAR (Jensen-Vinstrup, Rigamonti & Wulff, 2018). | Inspired on the augmented BHAR, it refines the matching process by means of propensity score matching on characteristics such as market beta, book value, size, momentum, investments, and country and industry dummies. The measurement of abnormal returns follows the augmented BHAR approach. |
| *Characteristic based benchmark* | Characteristic-based benchmark returns (Bessembinder, 2019) | The model eliminates the need for a benchmark firm for each event firm as per required by BHAR family models. It uses a simple two-stage OLS regression for the whole market firms as follows: (I) ***Stage 1***: estimates expected returns for all firms using cross-sectional regression on lagged firm characteristics. It estimates predicted returns using rolling averages of past slopes coefficients (from the previous regression) plus the sum of products of average slope coefficients over the prior 12 months. (II) ***Stage 2***: regresses all the *differences between realized and expected returns* on a constant and on indicator variables (dummies) that are set as one for firms/months of interest and zero other firms/months. Proponents of the model claim that the model is flexible and the model is valid for either long or short-term event studies. |

This table provides a chronological summary of the main methodologies.
Adapted from (Lamond & Platt, 2016; Schimmer, 2018; Pernecky, 2016). ; Jensen-Vinstrup, Rigamonti & Wulff, 2018).

African Research Journal of Education and Social Sciences, 7(2), 2020
ISSN (online): 2312-0134 | Website: www.arjess.org

### 2.1.2.1 Portfolio model

Unlike the standard BHAR that focus on holding period returns and base inferences only cross-sectional analysis, CTAR methodology tracks the effect of events of sample of portfolio over a period of time. Consequently, Zuev (2016) favours the method as it accounts for dependence of event-firm returns. However, following Schimmer (2018) the approach fails to capture reinvestment assumption, which represents the real experience of investor. The idea behind is that, investors reinvest their returns over time, while CTAR relies on simple mean returns. In fact, a simple exercise show that for long time horizon geometric mean deviates significantly form its simple mean.

One of its merits relates to ability to capture cross-sectional dependence of returns, as it calibrates abnormal returns on a regression (Getz & Page, 2016). However, theoretically, the calibration process using either CAPM or three factors model appears not capture other firm-characteristic correlations that may be relevant (Zuev, 2016). Adding to that, periodical rebalancing of control portfolio raises the said "rebalancing bias", concerning possibility of heteroscedasticity in the residuals. In the same fashion, due to rebalancing, the slopes coefficients are unlikely to be constant (Zuev, 2016). Altogether, these shortcomings render statistical inferences biased. In addition, following Sweeney & Goldblatt (2016), portfolio approach has low power to detect abnormal returns, as it effectively weights each period equally, while corporate events tend to cluster in certain times. To alleviate the problem Henninger (2018) advocates weighting calendar months by their statistical precision. On the ground of the aforementioned shortcomings, recent researches appear to favour more benchmark firm models in detriment of CTAR (Pernecky, 2016; Dutta, et al., 2018; Jensen-Vinstrup, Rigamonti & Wulff, 2018).

### 2.1.2.2Benchmark firm models

The key commonality of "benchmark firm models" is the requirement for benchmark firm, instead of calendar portfolios as per CTAR. This similarity in this group turns out to be a source of common criticism, relating to whether one can find a nearly "perfect" match, which describes properly the track of expected return of event firm (Pernecky, 2016). In contrast to CTAR, this set of models employ geometric mean of returns, fulfilling a flaw (reinvestment) pointed out by (Schimmer, 2018). This advantage has an intuitive downside brought to attention by (Zuev, 2016). The compounding effect does not allow for measurement of duration of abnormal returns. The rationale is that an abnormal return measured in the first-year compounds for the entire period even if the other periods show no abnormal returns and, therefore, the inferences will indicate abnormal returns for the entire period.

With specific regard to BHAR, a key flaw noted is its reliance on strong assumptions as to what drives the returns (Getz & Page, 2016; Bessembinder, et al., 2019), The construction of the model assumes that the returns are solely dependent upon the firm characteristics (i.e., size and market-to-book ratio) used to select the benchmark firms. This assumption is, however, in

African Research Journal of Education and Social Sciences, 7(2), 2020
ISSN (online): 2312-0134 | Website: www.arjess.org

contrast to the evidence shown by many finance researchers (Zuev, 2016; Liu, 2018; Schimmer, 2018). They provide evidence that stock returns depend on many observable variables. Hence, the chief concern in omitting relevant variables is the possibility of estimating misleading expected abnormal returns and thereby, abnormal returns. However, Pernecky (2016) points an additional challenge in attempt to match event firms based on many characteristics, which consists on degradation of the process over time (lack of matching firms).

Attempting to address the drawbacks of the latter models, Pernecky (2016) proposed an augmented version of the standard BHAR. In its essence, the model maintains the fundamentals of simple BHAR model. However, to control for other relevant characteristics that explain expected returns, they regress abnormal returns based on the BHAR model against firm-characteristic variables, as described in Table *2*, and the constant measures the real abnormal returns. Apart from accounting for firm characteristics, Pernecky (2016) claims that the model accommodates the impact of time variation in firm characteristics. Furthermore, authors assert that the model addresses the compounding and skewness problems of standard BHAR (Schimmer, 2018). The proponents also contend that model explains significant part of statistically significant abnormal returns found by previous researches using CTAR and standard BHAR. While the claims theoretically sound and intuitive, given the limited evidence on in it so far, these are still empirical matters to challenge in future research.

Starting from augmented BHAR and acknowledging the importance of good benchmark firm, Jensen-Vinstrup, Rigamonti & Wulff (2018) propose enhancement of matching process by introducing a second layer of matching, consisting of propensity score on the seven firm idiosyncratic characteristics as per **Table *2***. Although authors contend that the *enhanced augmented BHAR* improves the original model, propensity score matching technique only allows isolating heterogeneity from observable factors (Zuev, 2016). The proponent6s also indicate that benchmarking firms may be affected by themselves. Therefore, to some extent, the matched firms may be matching the event firms exactly because of the event, and, thus, they will not describe the normal returns fairly, rendering misleading estimations.

#### 2.1.2.3 Characteristic based benchmark model

More recently, in attempt to tackle the key drawback of the previous models, Pernecky (2016) proposed a somewhat innovative Characteristic-based benchmark returns model (hereinafter referred as to "CBR" and just for sake of reference). The novelty of CBR lies on two mains factors. First, CBR abstracts the need for benchmark firms or portfolio as per CTAR. This is key advance, as the model allows for controlling for as many characteristics insofar as necessary. Secondly, the model hinges on cross-section relations and characteristics estimated for the whole market, in contrast to enhanced augmented BHAR, which uses only characteristics from the control firms, which as contended by the authors, it enhances the power of statistical tests. Likewise, the authors also claim their model performs better than the recent four and five factor models (Spracklen & Lamond, 2016; Marshall, Nguyen & Visaltanachoti, 2019). However, this model has only been employed by the proponents insofar.

African Research Journal of Education and Social Sciences, 7(2), 2020
ISSN (online): 2312-0134 | Website: www.arjess.org

Although the concept of the CBR model appears to overcome the key shortcomings of the previous models (in either modelling returns or statistical tests), it would be tempting concluding that controversy and challenges in long-term ES methodology have reached their end. Conversely, given the limited evidence thus far, it is wise to rather recommending further empirical research to test the validity of the model and compare it with other latter improvements in other models.

In concluding note, amidst significant methodological improvements, important questions remain, and we here highlight two. First, the literature suggests that finance researchers focused on testing MEH, overlooking fundamental analysis. Although the "survival" of MEH against the evidence sounds important for asset pricing and trading strategies, Liu (2018) says stock returns are more likely to relay the understanding and expectations of investors, not necessarily the economic value of an event. Therefore, it may be legitimate to believe that, for instance, given the fundamental objectives of M&A, a fundamental analysis is also necessary for assessing a success of M&A although its success is subject to the accountability of financial figures portrayed by the financial statements. As far as we understand, this analysis is of particular importance for a shareholder holding shares not for trading. Flipping back the page to MEH, the second matter is well detailed by Sweeney & Goldblatt (2016) and lies on the way the MEH is tested. If a researcher intends to test MEH, a normative model is preferred over a positive one. The argument is intuitive and apparently compelling. For instance, if we assume that CAPM model is the equilibrium (normative) model, it is reasonable to agree that in any case, any departure from efficiency/equilibrium should be tested used the same model.

## 3. Conclusion

This paper provides a review on methodological approach of event studies (ES) and draw three main conclusions. While ES methodologies are straighter forward in short-term, that is not the case for long-term. Over the last decades, long-term studies with contradictory conclusions increased. Authors argued such findings are due to "bad models". Key merits and drawbacks of the most are well documented. Despite significant improvements, is not yet a proven good model for long term ES. Therefore, we recommend further empirical research to test the latest known contributions (Bessembinder, 2019; Jensen-Vinstrup, Rigamonti & Wulff, 2018). These contributions appear to open a new page on the debate in long-term ES. We find that finance researchers focused more on the run to testing the EMH in detriment to fundamental analysis. We advocate that ES should be extended to fundamental analysis, as this represents the true creation or destruction of value by some important events.

## References

Bessembinder, H. (2019). Investment Consulting.

De Jong, A., & Naumovska, I. (2016). A note on event studies in finance and management research. *Review of Finance*, *20*(4), 1659-1672.

African Research Journal of Education and Social Sciences, 7(2), 2020
ISSN (online): 2312-0134 | Website: www.arjess.org

Ding, L., Lam, H. K., Cheng, T. C. E., & Zhou, H. (2018). A review of short-term event studies in operations and supply chain management. *International Journal of Production Economics*, *200*, 329-342.

Getz, D., & Page, S. J. (2016). *Event studies: Theory, research and policy for planned events*. Routledge.

Henninger, S. R. (2018). Event Studies in Section 10 (B) Class Actions. *Transactions: Tenn. J. Bus. L.*, *20*, 787.

Jensen-Vinstrup, M., Rigamonti, D., & Wulff, J. (2018). European cross-border acquisitions: Long-run stock returns and firm characteristics. *Journal of Multinational Financial Management*, *47*, 31-45.

Lamond, I. R., & Platt, L. (Eds.). (2016). *Critical event studies: Approaches to research*. Springer.

Liu, T. (2018). Long-term event study on earnings surprises and practical portfolio construction. *Asian Economic and Financial Review*, *8*(6), 775-789.

Marshall, B. R., Nguyen, N., & Visaltanachoti, N. (2019). A Note on Intraday Event Studies. *European Accounting Review*, *28*(3), 605-619.

Pernecky, T. (Ed.). (2016). *Approaches and methods in event studies*. Routledge.

Schimmer, M. (2018). Event Studies in M&A Research.

Spracklen, K., & Lamond, I. R. (2016). *Critical event studies*. Routledge.

Sweeney, M., & Goldblatt, J. (2016, January). An exploration of mixed research methods in planned event studies. In *Journal of Convention & Event Tourism* (Vol. 17, No. 1, pp. 41-54). Routledge.

Zuev, D. (2016). Visual methods in event studies. *Approaches and methods in event studies*, 96-119

**About Author**

The author is a Masters Degree in Management and Finance holder from Bangor University, UK, Currently venturing into research and academics in Finance. He is also holds a Professional Certificate Level 7 in Strategic Management and Leadership from the Chartered Management Institute (CMI), London and an active member of the same body. The author has a Bachelor's Degree from Moi University, Kenya.