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Event Study Methodology for Stock Split Announcements

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Abstract: *The event study methodology is a standard methodology used to study the behaviour of stock prices around the specific corporate events like announcement of stock splits, bonus issues, right shares, dividend, mergers and acquisitions, changes in key managerial positions and changes in accounting rule as stated by Binder (1998) and Anjali Gupta (2016). This methodology first used by Fama et al (1969) to analyse impact of corporate events and most of early event study works are focused on examination of impact on share prices behavior in relating to corporate announcements and event study has become a standard methodology in financial economic research in order to measure and test the effect of particular event on stock prices and other aspects like trading volume, volatility, bid-ask-spread, abnormal returns, impacts on shareholders wealth and shareholding pattern . This paper discusses in detail about the event study methodology with specific reference to Market model, Market adjusted model and Mean adjusted model.*

Key Words: *Event study methodology, Corporate events, Stock splits, Share price, Market model*.

1. INTRODUCTION :

Event study is a tool is used to analyse the statistical significant reactions around the corporate announcements in stock markets. An event study measures reaction in financial markets to past occurrences of a given type of event that is hypothesized to affect the company market value and impacts on liquidity and volatility of stock.

Ball & Brown (1968) and Fama et al. (1969) are credited with event study methodology; they conducted study to examine the impact of an economic events or news on share prices. They are duly credited for popularity of this methodology which uses abnormal stock returns to understand impact of corporate events. There are numerous studies which are used event study tool. The most popular and cited research work related to event study tools are Brown and Warner (1980), Stephen J Brown and J.B Warner (1985), Corrado (1989), Cowan (1992) , Dolley (1933),Kothari and Warner (1997), Campbell (1997), Mac Kinlay (1997) , Binder (1998), Lo and Mac Kinlay (2004) and Anjali gupta (2016).

The corporate announcements either may be within the control of firm or may be not in firm's control. For example say announcement of stock split, this event that affects a firm's market value may be within the firm's control. Some events not in control of firms say changes in legislative acts announced, political and economical changes, they are outside the firm's control but such events will affect the firm's future operations in one and other way. An event study tool is used to study the reactions of the market to such events of interest. "An event study methodology assumes that stock markets are efficient to evaluate the impact of new events on the firms' expected future profits. McWilliams and Siegel (1997) states in their research work that an event study methodology, "determines whether there is an 'abnormal' stock price effect associated with an unanticipated event. From this analysis the researcher can infer the significance of the event". (Anjali Guta, 2016).

2. CLASSIFICATION OF EVENT STUDIES:

Event studies can classified to 3 groups such are

i. **Market Efficiency studies (EMH)**: These studies using event study methodology to assess the speed of impact and accuracy of impact of announcement information on market prices. Market efficiency may be strong-form or semi-strong form or weak-form.
ii. **Information impact studies**: These studies analyse the impact of corporate event on company's returns in respect to abnormal returns.
iii. **Group segregating studies**: These studies study the abnormal returns of stocks after segregating them into a various sub sections or sectors. Researchers in these studies will analyse the variation of abnormal returns among different sectors (Anjali Gupta, 2016).

3. STEPS IN EVENT STUDY:

The following steps involved in simple event study

i. Identify the corporate event of interest example stock split and define an event window.
ii. Select a set of companies or stocks to study and include in the analysis, to form a sample.
iii. Predict "normal" returns during the period of event window in the absence of the event using the estimation window period just immediate before the event window period.
iv. Calculate the abnormal returns within the event window, where the abnormal return is defined as the difference between the actual stock return and predicted market returns during the event window period.
v. Test the significance of results, whether the abnormal return is statistically different from zero or not.

4. MERITS OF EVENT STUDY METHODOLOGY:

The event study methodology has following advantages

- It uses stock prices and the expected effects of event are reflected immediately in stock prices.
- It is a more powerful and easy to design and understand the impact of event.
- It can able to detect abnormal performance of stock after announcement.
- It is an unbiased tool to estimate the risk and return on investments.
- It is comparably more accurate than accounting-based measures.
- It is easy to interpret results and can be used in less than perfect market conditions.

5. LIMITATIONS OF EVENT STUDY:

Event study has the following de-merits

- The basic assumptions of event study are not clear.
- It is not easy to ascertain likely implications of particular event in case of multiple events happen.
- Results may have independent and unexpected events impact.
- Event study uses abnormal returns as a measure for analysing stock/firm's performance.
- The selection of sample for study is not easy.
- This tool requires current knowledge of cause-effect relations that knowledge requires to analyse the impact prior and post announcement of any particular event.
- Important assumption and requirement for use of event study methodology is that market must be efficient.

6. APPLICABILITY OF EVENT STUDY METHODOLOGY:-

Event study tool can be used in for the study of following corporate events.

- IPO, Stock splits, Bonus issue, Right issue and Cross listing.
- Mergers and acquisitions.
- Earnings and dividend announcements.
- Announcement of quarterly or annual financial statements, audit report and ratings.
- Stock market information or recommendations.
- Insider trading activities.
- Changes in Political situation, Economic changes in micro and macro level.
- Investment strategies, index revision and other corporate announcements.

7. SELECTION OF SAMPLE FOR EVENT STUDY TOOL:

The sample can be decide and use for event study tool may have impact on following

- Confounding corporate events.
- Multiple corporate announcements.

- Anticipation of impact of events information.
- Leakage of events information and insiders trading.
- Self- reported data from stock market.
- Publicly traded firm's decisions.

8. PERIOD OF ANALYSIS FOR EVENT STUDIES:

The period of analysis is the span of time for which measurement of daily series of stock returns for the particular period from information of announcement of corporate actions like stock splits, earnings announcement, bonus issues, right issues, etc.. The analysis period includes announcement period and analysis period, which are considered in relation to event date.

An event study is composed of three time frames: the estimation window (sometimes referred to as the control period), the event window, and the post event window (Benniga Simon, Financial modeling, 4th edition, MIT press 2014)

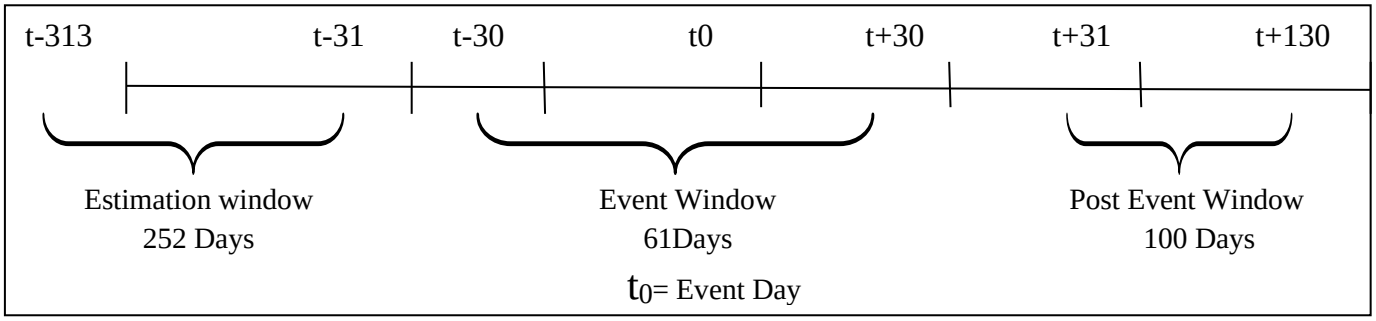
8.1 Event Day: The day on which corporate action announced by companies is considered as event day. The day around which effect is presumed to takes place or diffused effect takes place on stock returns. The event day denoted as t_0. Generally the first day on which the first public announcement of an event took place is taken by researchers for event studies.

8.2 Event Window: It is the period over which significant effect of corporate action/announcement is presumed to be reflected on stock prices and it is needed to study. The announcement period includes only event date and certain additional day's pre and post to event. The length of event window may short term like -1 to +1, -2 to +2, -5 to +5, -10 to +10, -15 to +15, -30 to +30, etc.. or long term window like -182 to +182, -365 to +365,etc..

8.3 Estimation Window: It will be any period used for estimating returns which are observed time series would have attained during event window period if the event has not occurred. Estimation window is the excludes event window period and the length of period may vary like 90 days, 100 days, 142 days, 182 days, 252 days if daily data considers and 240-360 days if monthly data considers for study depends on the researchers.

8.4 Post event window: The period of window is taken to analyse the impact of corporate actions on stock performance over a series of time after the event window period. The period is varying from researcher to researcher generally for long period of time analysis post event window used.

8.5 Time line of Event study



The time line illustrates the timing sequence of an event. The length of the estimation window is represented as t-313 to t-31 . The event occurs at time 0 and the event window is represented as t-30 to t+30 . The length of the post-event window is represented as t+31 to t130.

An event is defined as a point in time when a company makes an announcement stock split occurs. The event window often starts a few trading days before the actual event day. The length of the event window is centered on the announcement and now it is 30days before and 30 days after. This enables us to investigate pre-event leakage of information. The estimation window is also used to determine the normal behavior of a stock's return with respect to a market or industry index. The estimation of the stock's return in the estimation window requires us to define a model of "normal" behavior.

9. MODELS USED IN EVENT STUDY METHODOLOGY:

Expected return models (ERM) play a vital role in the event methodology studies. The Market Model (MM), Market Adjusted Model (MAAM), Mean Adjusted Model (MEAM), Capital Asset Pricing Model (CAPM),

Arbitrage Pricing Theory (APT), Fama Three and Four Factor Models and many other models. (Nagendra marisetty et al(2019)).

Each model has been developed under various assumptions for different purposes by using different inputs to know the stock expected return. It is difficult to say which model is superior from finance literature because every model has its merits and demerits. In the event study methodology most of the researchers used the market model, and some researchers only used more than one model to compare the returns in models.

9.1 Market Model (MM)

The Market Model is popularly used method in event studies to calculate expected and abnormal returns of stock during pre and post event window. This model is based on a simple linear regression formula and observes the relationship between stock returns and benchmark index returns like BSE SENSEX, S&P 500, NIFTY 50, etc. The main assumption of this model is that stock returns influenced by various factors, for analyses we may consider single factor, two or more factors.

The following steps followed for calculation using single factor market model

Step-1: Stock Return= $\frac{\text{SPit} - \text{SPit}-1}{\text{SPit}-1} \times 100$

Step-2: Market Return= $\frac{\text{IPit} - \text{IPit}-1}{\text{IPit}-1} \times 100$

Step-3: Normal Return= α+ (β*Market return)

Where, α is the intercept of stock return and market return of the stock

β is the slope of stock return and market return of the stock

Step-4: Abnormal Return (AR) = Stock return- Normal return

Step-5: Standardized abnormal return (SAR) = $\frac{ARit}{\sigma}$

Where, σ = Standard deviation of abnormal returns in estimation window

Step -6: Average abnormal returns (AAR) = $\frac{\sum_{t=1}^{N} ARit}{N}$

Test of Significance $t = \frac{AARit}{\sigma/\sqrt{30}}$

Where, σ= Standard deviation of SAR's of companies on day t

Step-7: Cumulative average abnormal return (CAAR) = $\sum_{t=-30\ to+30}^{n} AARit$

Test of Significance $t = \frac{CAARit}{\sigma/\sqrt{30}}$

Where, σ= Standard deviation of SAR's of companies on day t

9.2 Market Adjusted Model (MAAM)

This is the simple model used in event studies to calculate expected and abnormal returns during pre and post event window. This model is easy than market model, it assumes that expected returns of stock are equal to market returns without considering of any specific market and stock factors.

In this model abnormal returns are estimated by using the following equation.

Abnormal return (ARit) = Rit – Rmt

Rit = Stock return observed on day t

Rmt = Market or Index return observed on day t

9.3 Mean Adjusted Model (MEAM)

Another relatively simple model used in event studies to calculate expected and abnormal returns is mean adjusted model. This model special useful for researchers when they want to control past performance of stock and not depends on market returns. The following equation is used to estimate abnormal returns in mean adjusted model.

Abnormal return (ARit) = Rit – $\bar{Ri}$

Rit = Stock return observed on day t

$\bar{Ri}$ = Average return on i in the estimation window

9.4 t Test

t test used to determine the significance of abnormal returns in market adjusted and mean adjusted models. The following equation used to measure level of significance.

t = $\frac{AAR}{\sigma(\text{AAR})}$

AAR = Average abnormal return

σ (AAR) = Standard error of average abnormal return

Standard error is calculated is $\sigma(\text{AAR}) = \frac{\sigma}{\sigma/\sqrt{N}}$

σ = Standard deviation of the samples

9.5 Selection of Model

Selection of the suitable model for event studies is depends on different factors like availability of required data both historical and present data relating to stock and market, components of stock to be analyze, type of the corporate event like stock splits, bonus issues, right issues, earnings announcement, dividend announcement, etc.. and the specific questions that being to be addressed in study by researcher.

10. CONCLUSION:-

Event study methodology is considered most popular tool to conduct studies and analyses the presence or absence of statistically significant reaction to corporate actions and announcements made by companies. Corporate events have measurable impact on stock prices, returns, shareholders wealth, trading volumes, bid-ask spread and brings volatility in the market. The main focus of the event study lies on whether reaction observed in the market is significantly different from what is normally should be in case of no event occurs in the market like stock splits, right issues, bonus issues, etc..

Ball and Brown (1968), Fama, Fisher, Jenson and Roll (1969) and S J Brown and J B Warner (1985) proposed and credited with standardized event tool methodology to examine the impact of corporate events on stock prices. Like way, Event study methodology can be used for analysing impact of announcements of stock splits on share prices. There are different models of event studies to measure abnormal returns around the announcement of corporate events, out of which Market model is considered as a most popular and powerful to measure returns and impact in event studies.

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