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Methodological issues in conducting an event study

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Abstract
Event studies have been widely used in Finance, Management and Marketing research. Over the years many refinements have been made to this methodology to address issues and challenges in its proper execution. This paper examines the various methodological issues which arise while conducting an event study and how they have been addressed in the literature. These issues are of critical importance as they could have a bearing on the results of the study and if not considered properly or taken into account, they may hamper the validity of the results.

Keywords: Event studies, methodology, estimation window, event window, confounding events

Introduction

Over the years event studies have become quite popular method in conducting research particularly in the area of Management, Finance and Marketing (Sorescu *et al*.,2017) [25]. They are one of the most powerful and widely techniques used to study the impact of announcement of any event of interest on the stock price of a company and its overall value. They specifically look at the effect on market price of a security surrounding an announcement. This makes them a helpful technique in finding out the financial influence of activities which could be initiated by a company or are initiated externally. The purpose of performing them is to gauge the excess or abnormal returns which the stock market participants are able to generate over and above the normal returns particularly from the release of new information which requires a change or adjustment in the perception of the investors. The markets may not be able to anticipate it and thus are caught unaware. This might lead to price formation and price discovery. The market prices of such companies may change drastically which could be either upwards or downwards depending on the positive or negative future cash flows anticipated by this event. There could also be a change in the liquidity of the stocks as it attracts attention of the market participations. Excess or abnormal return is obtained by subtracting the actual return from the expected return- return which is generated if the event did not take place. Prediction of the returns is based on a return generating model like the capital asset pricing model. These announcements could be generated by the firm in the form of various corporate announcements for e.g. announcement of bonus shares, buy back of shares, stock splits, appointments of various categories of directors (Boyd *et al*., 2010), earnings announcements, stock splits etc. In marketing they could be used for brand related announcements say for example sponsorship announcements (Cornwell *et al*., 2005) [7]; Mezodier and Rezae2013); announcements of mergers and acquisitions (Sorescu *et al*., 2007) [24], Swamination *et al*., 2008); announcements of products (Sood and Tellis, 2009) [23]; partnerships (Fang *et al*., 2015) [12].Thus, event studies are reliable in knowing the above normal returns of a stock in case of an unanticipated event (Ismail and Manaf (2016) [13].

Theoretical Foundation

The theoretical foundation of event study methodology is provided by Fama (1970) [10] in his seminal work known as the Efficient Markets Hypothesis (EMH) for which he received the noble prize in Economics in 2013. The markets are informationally efficient if all publicly available information is factored or captured in the prices by the stock market participants at any given point of time. Secondly, the share prices react to any new information very quickly and this new information is absorbed or reflected in stock prices immediately. In today's technologically advanced markets, this information is said to be reflected within 15 minutes of this being available to the markets. Thus, it is posited that if the markets are efficient then their reaction to any new news would be very fast (MacKinlay, 1997) [18]. The markets could also be aware of such information much before it is formally announced (Bhattacharya *et al*., 2000) [3]. Thus, event studies test market efficiency (Fama 1991, Ross 2005) [21]. In an efficient market changes in securities prices to release of information is quick and fast. An effective event study shall measure the speed with which the market factors the new information into the price of securities. Any abnormal return seen before the announcement of the event may indicate anticipation of the news by the market or even insider trading by people having access to such information. Generation of excess returns on announcement day for the event indicates that the market was not aware of the announcement. Malkiel (2003) [20] posits that in an informationally efficient market one cannot earn abnormal returns without taking risks which are above average. Thus, there is a basic presumption now that the markets are informationally efficient and it is very difficult to beat the market. This has given rise to a large number of index funds around the world.

Thus, event studies are used to find out whether an announcement creates a change in the share price of a company. Such excess or abnormal returns (AR) are computed by subtracting normal return from the security's actual return. We can measure a company's expected return by using the market model. For this purpose, we require a well-designed stock market index to generate the expected returns. The market model measures the correlation between a company's stocks' return vis-a vis its corresponding index returns. It is also useful to sum the excess returns to calculate the cumulative abnormal return (CAR), which shows the effect of an announcement over a particular time duration called the event window. One can create many

event windows of different time periods to assess the effect of a particular announcement.

Dolly (1933) [8] is credited to introduce the event study methodology. He looked at the changes in securities prices surrounding the announcements of stock splits. It was later on that Ball and Brown (1968) [1] refined this technique and that is what we use today. It was Fama, Fisher *et al*., (1969) [9] that really made the event study popular through their seminal work. Brown and Warner (1980, 1985) [5, 6] have contributed significantly in stream lining the procedure of the event study methodology. Their important contribution is that choosing what amounts to an event date is very important. Williams (1988) [28] posits not to exclude any announcements due to concurrent confounding news releases as they feel that such exclusions eliminate valuable data.

Points to be Considered in Conducting an Event Study

Numerous studies show that there are many important issues which have to be considered while conducting an event study (MacKinlay, 1997; Sorescu *et al*., 2017) [18, 25]. These issues should be considered carefully as they could have an important bearing on the results of the study. These issues could seriously hamper the results of the study. These considerations are:

1. Identifying and Defining an Event

The event of interest should be clearly identified and defined as it could have a significant effect on the results and the conclusions of the study. It is always pertinent to define what constitutes the "event" that we are examining. For e g., in the case of examining the impact of a merger, the date which could be taken as an event date could be the date on which the press first reports it, or, the date of board meeting when the company's board formally announces it or the date on which the merger is finally implemented. All these dates would give different results. In the case of any regulatory announcement it becomes very difficult to pin-point the actual date as the process may take months due to many procedural requirements.

2. Duration of the Event Window

It is critical to determine the exact duration of the event window for the results to be of any significance. For this purpose, the exact start of the date and end of the date should be determined. The start of an event window does not pose any problem as we are aware of the time when the event has taken place but we do not know the time when the announcement or the new release of information is fully captured or factored by the market in share prices (Krivin *et al*., 2003) [16]. McWilliams and Siegel (1997) [19] reviewed research papers using this methodology and found that that researchers have taken event windows of varying length from 181 days i.e. from -90 days before the event to +90 days after the event to as short a period as 3 days (-1 to +1). They posit that if there are any chances that the information could be known to people prior to its formal announcement then it is better to use an event window of a longer duration. If the event window is of a short duration, then it might not be able to capture the anticipatory effects or post-event adjustments. On the other hand, if a window is too long then it could capture noise from other unrelated events occurring at the same time. Ryngaert and Netter (1990) are of the opinion that normally short event windows should be used as they are able to effectively capture the effect related to an event. They also opine that it is very important to determine the appropriate length of an event window. It is pertinent to look at the nature of the event study in determining the length of the event window. A major study was conducted by Kothari and Warner (2008) [15] which found that 200 research papers had used an event window of 12 month or long to examine the changes brought about by an event.

3. Determination of the Estimation Window

In an event study we use an estimation window to determine the normal stock returns of companies in relation to market which is proxied by a well-designed index. We measure the stock's normal movements and correlation with an index (Krivin *et al*., 2003) [16]. When we estimate the returns generated by a stock in the estimation window, we also have to decide about the return generating model that we shall use for this purpose which will give us the normal returns. This we do with the help of regression analysis (Benninga, 2014) [2]. Normally, an estimation window consists of 252 trading days but one may not have so many days in the sample then as a thumb rule a minimum of 126 observations are used to correctly estimate the parameters of the model. Less than this number of days may not capture the actual stock price movements and may give a wrong relationship among returns of securities and returns of the market (Benninga, 2014) [2]. While designing the length of the window it should also be kept in mind that the company should not have undergone a major change in its line of business or its profitability.

4. The Choice of an Index

We calculate the return generated by the market through an index which is used to measure "normal" movements in estimation window (Krivin *et al*., 2003) [16]. The choice of an index should not pose any difficulty as there is a wide choice of indices which are normally available to choose from. It is always useful to choose a broad market index which fairly represents the whole universe of stocks listed on the stock exchange. An index which represents majority of the industries in the economy should be used. Its constituent companies should capture the maximum market capitalisation of the companies listed on a stock exchange. For e.g. the market capitalisation of Nifty 50 index is Rs.19,418,692 crores as on May 8, 2025 compared to Rs. 15,786,969 crores of S&P BSE Sensitive index. The total capitalisation of BSE listed companies is Rs 3,93,000 crores on the same day.

5. Post Event Window

Post event window is very useful in telling us about the long-term effect of announcement or the event. It might be as short as 10 days or as long as a year. Its length would depend upon the nature of the event we wish to examine. It is also observed that a fixed length window may not be useful if one is only examining a small number of securities or for that matter a single security. This is so because in such a scenario the over and under reaction which one observes in the market price of a stock will not be off-set by over or under reaction in case of other security as the law of large number will not apply (Krivin *et al*., 2003) [16].

6. How to Treat Confounding Effects due to Concurrent Events or Clustering

There might be several simultaneous corporate announcements by a company say for e.g. earnings and dividend announcements, restructuring programs and share repurchases, board appointments and resignations and a merger announcement. If we are interested in knowing the impact of the merger announcement on stock prices, these simultaneous announcements make it difficult to isolate our event of interest. Therefore, it is important to understand how we treat them. It becomes all the more difficult if we are examining various macroeconomic events or events which are spread across the industry.

7. How to Select an Appropriate Asset Pricing Model?

There are several return generating models like the market model, mean-adjusted returns, and factor models which are available. We have to select a model in order to estimate the expected returns from a company's stock which would have been generated if the event had not taken place. Naturally, the kind of model which is chosen shall have an impact on the excess returns which are attributed to the event. MacKinlay (1997) [18] posits that any return generating model can be used and the results of the study are not hampered by the choice of the model used. Brown and Warner (1985) [6] showed that in case of a large sample of events the results are not affected by the kind of estimation model. They even suggest the use of alternative models if the sample for analysis is small.

8. Anticipation and Leakage

It is also observed that information could even become available in the market without any official announcement by a company (McWilliams and Siegel 1997) [19]. This is commonly known as leakage. In such cases the market would adjust the price much before its formal announcement. In order to account for this normally a day before the event day is taken in the event window.

9. Specification of Price Measurement

One has to decide about the specification of price measurement i.e. are we taking trading price or the bid ask mid-point; are we taking the daily closing price or weekly or monthly price. This will have a significant impact on the results of the study. One should also be careful to have a large number of observations for the results to be meaningful. It is quite pertinent here to point out the conclusion of Brown and Warner (1985) [6] regarding specification tests "although daily excess returns are also highly non-normal, there is evidence that the mean excess return in a cross-section of securities converges to normality as the number of sample securities increases."

10. Tests of Significance and Power of Tests

In some cases, the statistical tests used might have low power to detect a real event effect, resulting in the inability to reject the null hypothesis that there are no excess returns. This has been widely discussed by (Kothari and Warner 1997, MacKinlay 1997) [14, 18]. "Power is determined by three factors: sample size, the actual size of abnormal returns, and the variance of abnormal returns across firms" (Sorescu *et al*., 2017) [25].

Conclusion

This paper examined the various methodological issues which arise while conducting an event study. These issues are of critical importance as they could have a bearing on the results of the study and if not considered properly may hamper the validity of the results. The issues which have been considered range from identifying and defining an event, duration of the event window, determination of the estimation window, the choice of the index, post event window, treatment of confounding effects due to concurrent events or clustering, selection of an appropriate asset pricing model, anticipation and leakage, specification of price measurement, and tests of significance and power of tests.

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