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Impact of Terrorism on Asian Stock Markets

M. Selvam
I. M. Raja

Abstract

The prices of individual stocks reflect investors' hopes and fears about the future and taken in aggregate, stock price movements can generate a tidal wave of activity. Because of their liquidity, events like terrorist attacks, military invasions and other unforeseen disastrous occurrences can have serious implications for the prices of the stocks and bonds. The event study methodology is used to assess the effect of terrorism (September 11, 2001 terrorist attack) on Asian capital markets. In the present study, an attempt is made to examine how the Indian stock markets and their various indices (Bombay Stock Exchange and National Stock Exchange) reacted to the September 11th, 2001 terrorist attack and how the Asian stock markets reacted to it. The study found that among the Asian stock markets, Indian stock markets are more resilient than in the past and they recovered sooner from terrorist attacks than other Asian stock markets.

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Keywords: Asian Capital Markets, Terrorism, Event Study Methodology, Efficient Market Hypothesis, Market Resilience.

1. Introduction

The capital market is seen as the major vehicle of economic growth in all the countries. It plays a pivotal role in the allocation of economic resources into the productive activities of the economy. This allocation takes place through the appropriate pricing of securities traded in the market. A capital market in which stock prices fully reflect the available information can be termed as efficient (Dreman.D.N.1977). Fama (1970) classified market efficiency into three categories based on the information set such as weak form, semi strong form, and strong form. The securities' prices adjust themselves rapidly to new information as it becomes available and the changes in security prices will reflect the flow of information to the market (Ball and Brown, 1968, P.160). The prices of individual stocks reflect investors' hopes and fears about the future price of the stock. The stock price movements can generate a tidal wave of activity in the stock markets. Because of their liquidity, events like terrorist attacks and other unforeseen disastrous occurrences in the country can have serious implications for the prices of stocks and bonds. The decision to buy and sell stocks can quickly, easily and inexpensively, be reversed. When information becomes available about a cataclysmic event like a terrorist or military attack, investors often flee the market in search of safer financial instruments, and panic selling ensues. This initial panic has the potential to plunge the market into a state of chaos and initiate a long-term bear market or it can be reversed if investors' hopes turn.

Terrorist attacks have great potential to affect capital markets around the world in a short period of time. In today's information oriented world, news travels very fast and can spread quickly like a contagious disease. The uncertainty about what the future holds and about individual firms' abilities, and the resources needed to see them through a crisis, often cloud judgment, sending many investors into a state of panic. Moreover, terrorist and military attacks often increase the basic cost of doing business. Economic institutions like banks/ financial institutions seem to be an important force in returning markets to relative stability. To increase market stability, policy makers and regulators around the world should be aware of these strong

forces and the inter-relatedness in global stock markets and thus, proactively share information in a timely manner in a move towards greater global cooperation and communication.

The September 11, 2001 attacks consisted of a series of coordinated terrorist suicide attacks by Islamic extremists on the United States of America. On that morning, nineteen terrorists affiliated to al-Qaeda hijacked four commercial passenger jet airliners and intentionally crashed two of the planes (United Airlines Flight 175 and American Airlines Flight 11) into the World Trade Center in New York City, resulting in the collapse of both buildings soon afterwards and extensive damage to nearby buildings. The hijackers crashed a third airliner (American Airlines Flight 77) into the Pentagon in Arlington County, Virginia, near Washington, D.C. Passengers and members of the flight crew on the fourth aircraft (United Airlines Flight 93) attempted to retake control of their plane from the hijackers; that plane crashed into a field near the town of Shanksville in rural Somerset County, Pennsylvania. In addition to the 19 hijackers, 2,974 people died as an immediate result of the attacks, and the death of at least one person from lung disease was deemed by a medical examiner to be a result of exposure to WTC dust. Another 24 people were missing and presumed dead. The victims were predominantly civilians.

2. Statement of the Problem

It appears obvious that a terrorist or military attack would have a likely negative effect on capital markets. Uncertainty about what the future holds and about individual firms' abilities and the resources needed to see them through a crisis often cloud judgment, sending many investors into a situation of panic. Moreover, terrorist and military attacks often increase the basic costs of doing business as security is enhanced and shipping times lengthened. Strong economies rely upon strong banking/financial sectors, which are in turn influenced by effective and appropriate monetary policies. In times of crises, it may be necessary for policymakers to add a degree of flexibility in order to provide adequate liquidity to a shaky and panicky market. In most cases, the researchers expect the banking/financial sector to respond to news of terrorist or military attacks by generating significant negative returns. But

if the outlook improves rapidly in this sector, perhaps because the nation's monetary authority quickly provided adequate liquidity, then it helps the associated capital market also to quickly improve. Already researchers and analysts have identified several historic terrorist attacks and military invasions and compared the depth and statistical significance of the negative returns in the capital market in view of various events. Many studies have attempted to test the impact of terrorism on developed markets in USA, UK and Germany, but no study has so far attempted to test the impact of terrorism on Asian stock markets. Hence, the present study is an attempt to fill the gap.

3. Objectives of the Study

The present study has the following objectives:

1. To analyze the significance of the September 11th terrorist attacks on the sample Asian Stock markets
2. To study the duration of these effects (number of days) in the sample Asian Stock markets.
3. To test the event day effect (day of terrorist attack) on the sample Asian Stock Market.
4. To offer suggestions to policy makers, investors and investment institutions to take necessary steps to protect against these unexpected cataclysmic events.

4. Hypothesis of the Study

The present study tested the following hypotheses

1. The September 11th terrorist attack is associated with significant negative abnormal returns in Bombay Stock Exchange indices. (Sensex, BSE 100, BSE 200 and BSE 500)

2. The September 11th terrorist attack is associated with significant negative abnormal returns in the National Stock Exchange indices (Bank Nifty, S& P CNX 500, CNX MIDCAP, CNX MIDCAP 200, S&P CNX Nifty and CNX Nifty Junior)
3. The September 11th terrorist attack is associated with significant negative returns in Asian stock markets.

5. Review of the Literature

The following relevant literature is reviewed:

Fama et al., (1969) in his study entitled "*The adjustment of stock prices to new information*" emphasized that the event-study methodology is based on the efficient market hypothesis. The hypothesis generally states that as new information becomes available (perhaps as the result of significant expected event), it is fully taken into consideration by investors assessing its current and future impact. The investors immediately reassess individual firms and their ability to withstand potential economic, environmental, political, societal, and demographic changes resulting from the event.

A study on "*Using financial data to measure effects of regulation*" by Schwert. G.W, (1981) has pointed out that the new assessment results in stock price changes that reflect the discounted value of current and future firm performance. The significant positive or negative stock price changes can then be attributed to specific events. The strength of the event study method lies in its ability to identify such abnormal changes because it is based on the overall assessment of many investors who quickly process all available information in assessing each individual firm's market value.

Brown S.J., Warner J.B. (1985) in their study entitled "*Using daily stock returns: the case of event studies*" measures markets' (or major market sector's) abnormal performance and statistically tests the significance of the economic impact of an event on world capital markets as measured by the deviation of index returns from their average.

Arshanapalli Doukas, Hemo.y, Masulis.R.W (1990) in their study entitled "International Stock Market linkages: evidence from the pre and post October 1987 period" found that in this information age, news (especially bad news) spreads very rapidly around the world with quick spillover or contagion effects, making the global capital market today more tightly inter-linked.

Abadie and Gardeazabal (2003) use the event study methodology to examine the economic impact of terrorist conflicts on firms in the Basque Country, Spain. They found that stocks of firms with a significant part of their business in the Basque Country showed a positive relative performance when a truce became credible, and a negative relative performance occurred at the end of the ceasefire.

An analysis of the above literature shows that terrorist attacks have great potential to affect capital markets around the world in a short period of time. In today's information oriented world, news travels very fast and can spread quickly likely a contagion. The event methodology allows us to statistically test the significance of the economic impact of an event on world capital markets.

6. Methodology of the Study

The event-study methodology is a forward -looking approach that focuses on identifying abnormal returns to firms from a specific event. If the investors react favourably to an event, one would expect positive abnormal stock returns around the event date. Alternatively, if the investors react unfavorably to an event, it would expect negative abnormal stock returns. Hence, when analyzed using composite stock indices, abnormal returns provide a means of assessing the capital market's response to specific events.

7. Sample Selection

For the purpose of this study, all the indices used two top Indian Stock Exchange (National Stock Exchange and Bombay Stock Exchange) and one popular index from other Asian stock exchanges. A list of sample stock market indices is given below.

List of Sample Stock Market Indices

| Sl.No | Country | Name of the Stock Exchange | Selected Stock Market Index |
|-------|-------------|-----------------------------|---|
| 1 | Japan | Tokyo Stock Exchange | Nikkie 225 Index |
| 2 | Hong Kong | Hong Kong Stock Exchange | Hang Seng Index |
| 3 | South Korea | South Korea Stock Exchange | Kospi Index |
| 4 | Taiwan | Taiwan Stock Exchange | Taiwan weighted Index |
| 5 | Singapore | Singapore Stock Exchange | Strait Times composite Index |
| 6 | Malaysia | Kuala Lumpur Stock Exchange | KLSE composite Index |
| 7 | Thailand | Stock Exchange of Thailand | SET Index |
| 8 | Indonesia | Jakarta Stock Exchange | Jakarta Index |
| 9 | India | A) Bombay Stock Exchange | Sensex, BSE 100, BSE 200 and BSE 500 |
| | | B) National Stock Exchange | NSE Bank Nifty, S&P CNX 500, CNX MIDCAP200, S&P CNX Nifty, CNX MIDCAP, CNX Nifty Junior |

Sources of Data : www.yahoofinance.com
www.indiainfo.com

The information about share price and sample indices was obtained from the websites of www.yahoofinance.com and www.indiainfo.com and the website of the [sample stock exchange index](#). The information regarding Indian Capital Markets was obtained from the *RBI publications, Bombay Stock Exchange official directory* and BSE websites www.bseindia.com.

8. Period of the Study

The present study covers a period of one year - 2001 (Jan 2001 to December 2001) and one event (September 11th, 2001 terrorist attack)

9. Tools used for Analysis

The following tools are used to analyze the significance of the stock returns against the event of the terrorist attack.

- a) Daily excess returns were measured by the mean-adjusted returns approach by using the following formula (as used by Brown and Warner 1985)

$$AR_{jt} = R_{jt} - R_j$$

Where

AR_{jt} is the abnormal (or excess) returns for stock index j at time t,
R_{jt} is the actual observed rate of returns for stock index j at time t, and

- b) In order to calculate the Cumulative Average Abnormal Return (CAR), the following formula is used as suggested by Brown and Warner (1985)

$$R_j = \frac{1}{20} \sum_{t=-30}^{-11} R_{jt}$$

Where,

R_j is the mean of stock index J's daily returns in the (-30, -11) estimation period

If the date of the event is t = 0, the mean adjusted returns model is estimated over 20 days, from t = -30 to t = -11 relative to the event date. The main event window under study is the event date itself (t = 0). However, this study examined two longer

event windows to see how well and how quickly the market digested the news. The two longer event windows are from the event date to five days following the event (t = + 5) and from the event date to ten days following the event (t = +10). For these longer event windows, cumulative average abnormal returns (CARs) were computed. Sometimes, the initial uncertainties persist and that keeps stock prices down and volatile, but at other times these fears are reduced because of new information that eases market tensions or policy actions that promote greater market stability.

10. Limitations of the Study

The followings are the limitations of this present study:

1. The present study is confined to only secondary data.
2. All the limitations of the tools used are applicable to this study.
3. This study is restricted to nine indices in the Asian Pacific countries.
4. This study covers only one event (September 11, 2001).

11. Analysis of the Study

For the purpose of analysis, the study is divided into two sections as follows:

Section-A : Impact of the September 11th attack on the Indian Stock Exchange (BSE and NSE)

Section-B : Impact of the September 11th attack on the Asian Stock Exchanges

Section-A : Impact of the September 11th, 2001 terrorist attack on the Indian Stock Exchange

1. Bombay Stock Exchange

Table 1 shows the Abnormal Returns (AR) and Cumulative Abnormal Return (CAR) of various BSE (Bombay Stock Exchange) index like Sensex, BSE 100, BSE 200 and BSE 500. In Bombay Stock Exchange, Sensex experienced the -0.45% (AR) on event day but it gained positive abnormal returns of 1.49% on 6th day event window and it slowed down to 0.24% (AR). It indicates the fact that Sensex experienced negative abnormal returns (-0.45%) on event day alone.

BSE100 secured negative abnormal returns of -0.31% on event day (11th September 2001) but longer event windows like 6th day and 11th day obtained positive cumulative abnormal returns (CAR) of 1.63% and 0.36% respectively. It is understood from the above analysis that the September 11th attack prompted negative abnormal returns on event day only (September 11th 2001).

Both BSE 200 and BSE 500 secured negative abnormal returns of -0.32% and 0.31% on event day but in the case of longer event windows (6th and 11th day), both the indices (BSE 200 and BSE 500) experienced positive cumulative abnormal returns of 1.79% and 1.85% (6th day) and 0.32% ,0.66% (11th days) respectively.

From the overall analysis of the above Table, it is understood that all the indices in the Bombay Stock Exchange experienced negative abnormal returns on event day (September 11th 2001) and it indicates the fact that the news of the September 11th terrorist attack was immediately absorbed by the Bombay Stock exchange.

Hence Hypothesis 1 entitled 'The September 11th terrorist attack is associated with significant negative abnormal returns in the Indian stock market (Bombay Stock Exchange)' is accepted

2) National Stock Exchange:

Table 2 explains the abnormal returns and cumulative abnormal returns of various National Stock Exchange indices (Bank Nifty, S&P CNX 500, CNX MIDCAP, CNX MIDCAP 200, S&P CNX NIFTY and CNX Nifty Junior).

In the National Stock Exchange, Bank Nifty experienced negative abnormal returns of 0.34% on event day (September-11, 2001) but during the longer window period (6th day, 11th day), it gained 0 cumulative abnormal returns (CAR) of 2.64% and 0.71%. It is inferred from the above analysis that the September 11th terrorist attack influenced (negatively) Bank Nifty only on the event day but in the long period, the market rebounded positively.

In the case of S&P CNX 500, it secured negative abnormal returns of -0.17% on the event day, but it obtained the Cumulative Abnormal Returns (CAR) of 1.44% on 6th day and 0.26% on 11th day. The above analysis reveals the fact that the September 11th 2001 attack was immediately absorbed by the S&P CNX 500 (event day).

Both CNX MIDCAP and CNX MIDCAP 200 experienced negative abnormal returns of -0.26% and -0.29% on the event day. On the 6th day of the event, both indices (CNX MIDCAP and CNX MIDCAP 200) obtained positive cumulative abnormal returns of 2.86% and 2.18% but during the longer window period (6th day and 11th day), these indices secured negative cumulative abnormal returns (CAR) of -0.36% and -0.20%. It is understood from the above analysis that both the indices experienced the September 11th terrorist attack immediately (day of the event) but in the longer window period (11th day), both the indices absorbed the information positively.

Indices like S&P CNX Nifty and CNX Nifty Junior secured abnormal returns (AR) of -1.46% and -0.51% respectively on the event day, but on the 6th day, both these indices gained cumulative abnormal returns (CAR) of 1.86%, and 2.43% respectively. In the case of the longer window period (11th day), the S&P CNX Nifty gained positive cumulative abnormal returns (CAR) of 0.15%, but CNX Nifty Junior gained

a negative CAR of -0.55%. It establishes the fact that the September 11th attack was immediately absorbed by both the indices, but in the longer period, it returned to normal level.

From the over all analysis of the above Table, it is asserted that all the national stock exchange indices experienced negative abnormal returns on the event day (September 11, 2001), but in the longer window period, these indices secured negative Cumulative Abnormal Returns. It demonstrates the fact that NSE (National Stock Exchange) absorbed the event of September 11th terrorist attack immediately.

Hence Hypothesis 2 "The September 11th terrorist attack is associated with significant negative abnormal returns in the Indian Stock Market (National Stock Exchange)" is accepted

Section B- Impact of September 11th 2001 attack in the Asian Stock Market:

Table 3 shows the abnormal returns level for day 6 and 11th day event windows, following the September 11th 2001 terrorist attacks for eight capital markets located around the Asian Continent. All the sample Asian capital markets experienced significant negative abnormal returns (AR). The day investors, who first learned of the September 11th terrorist attacks against the United States, lost more than the investors who did not learn immediately.

Among the eight Asian capital markets, South Korea (KOSPI Index) obtained high negative abnormal returns (-12.42%) on the event day, followed by Hong Kong (Hang Seng Index) -8.45% and Japan (Nikkei 225 Index) -6.20%. It is to be noted that markets like Indonesia (Jakarta Index), Taiwan (Taiwan Weighted Index) and Malaysia (KLSE Composite Index) gained the lowest negative abnormal returns on the event day (-3.42%, -3.82% and -4.46%) respectively.

In the case of the 6th day Cumulative Abnormal Returns (CAR), markets like Malaysia (KLSE composite index), Singapore (Straight time composite index) and South Korea (KOSPI Index) experienced high negative cumulative abnormal returns (-12.45%, -12.07 and -11.82) respectively. Very low negative cumulative abnormal

returns were reported by Japan (Nikkei 225 Index), Indonesia (Jakarta Index) and Hong Kong (Hang Seng Index) with (-0.56, -4.58 and -5.57%) respectively.

In the longer event window (11th day), cumulative abnormal returns (CAR) were experienced by markets like South Korea (KOSPI Index), Singapore (Strait times composite index) and Malaysia (KLSE composite index) with value of -16.65%, -16.00% and -15.41% respectively. But Markets like Japan (Nikkei 225 Index), Taiwan (Taiwan weighted Index) and Hong Kong (Hong Seng Index) obtained lowest negative values (-3.05, -4.67% and -5.25) on the longer event window.

The investigation of the impact of the September 11th 2001 terrorist attack on the sample capital markets revealed that markets like South Korea, Hong Kong and Japan experienced higher abnormal returns (-12.42%, -8.45% and -6.20%) on the event day (September 11th 2001). It indicates the fact that the above markets very quickly absorbed the news of terrorist attack and recorded high negative abnormal returns. But markets like Singapore (Strait Times composite index) and Malaysia (KLSE composite index) experienced high negative cumulative abnormal returns (-16.65%, -16.00% and -15.41%) on the longer event window (11th day). It is understood from the above analysis that the September 11th terrorist attack was associated with significant negative returns in almost all the Asian capital markets in the sample.

Hence Hypothesis 3 entitled "The September 11th terrorist attack associated with significant negative returns in Asian Stock Markets" is accepted.

12. Findings of the Study

The following are the important findings of the study:

1. In the Bombay Stock Exchange, all the indices reacted negatively (Abnormal Returns) on the day of the September 11th, 2001 terrorist attack. But on the longer window period (6th day and 11th day) of the event, all the indices in the Bombay Stock Exchange rebounded positively. (Positive Cumulative Abnormal Returns).
2. All the indices in the National Stock Exchange reacted negatively (Abnormal Returns) on the day of the September 11th, 2001 terrorist attack. But on the longer window period (6th day and 11th day), all the indices in the Bombay Stock Exchange rebounded positively. (Positive Cumulative Abnormal Returns).
3. Almost all the Asian Stock Markets in the sample were associated with significant negative abnormal returns on the day of the September 11th, 2001 terrorist attack.

13. Conclusion

It is proved from the findings that Indian stock markets are more resilient than they were in the past. Further, they recovered sooner from terrorist attacks than other Asian stock markets. The Asian stock markets are closely and tightly inter-related and therefore policy makers and regulators around the world must always be aware of what is going in other parts of the world in general and in Asian countries in particular. In today's information economy, news spreads rapidly and has the potential to have serious negative consequences in a very short time. Thus, it is important for regulators and policy makers to cooperate and communicate more with each other on a regular basis. This includes important information like unusual stock trading or large dollar transactions that might have consequences elsewhere, developing disaster recovery plans, etc. The terrorist attacks cannot be avoided and disruption through these events can be minimized by sharing important information.

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