

**The Stock Market Impact of International Terrorist Attacks: An Empirical  
Investigation of Short Term and Long Term Effects in the Japanese Equity  
Market**

Terrence Hallahan, Vikash Ramiah, Tony Naughton, and John A. Anderson<sup>†</sup>

School of Economics, Finance and Marketing, RMIT University, GPO Box 2476V,  
Melbourne,3001, Australia.

<sup>†</sup> Institute of Finance and Banking, The British University in Dubai, Hon Fellow, Sir John Cass  
Business School, City University, London. PO Box 502216, Dubai, UAE.

**Address for Correspondence:**

Associate Professor Terrence A Hallahan  
School of Economics, Finance and Marketing  
RMIT University  
Level 12, 239 Bourke Street  
Melbourne, Australia, 3000.  
Tel: +61 3 992572  
Fax: +61 3 9925 5986  
Email: [terry.hallahan@rmit.edu.au](mailto:terry.hallahan@rmit.edu.au)

## **Abstract**

We examine the impact of five terrorist attacks on 34 Japanese industrial sectors. Our evidence shows differential sectoral effects; the strongest impact indicates significant short-term negative abnormal returns around the September 11 terrorist attacks, where we document negative industry abnormal returns as high as 9.67 percent on the first trading day. The Madrid attack also had a negative effect on these industries, but to a much smaller degree. Interestingly, we also detect a positive effect in response to the Bali bombings. Surprisingly, no response to the Mumbai and London bombings was detected. We further demonstrate terrorist events lead to an increase in systematic risk of these sectors in both the short and long run following the attacks.

**JEL Classification:** G1, G11, H56

**Keywords:** Terrorism, Equity Market, Abnormal Returns, Systematic risk, Non-Parametric test and Parametric Test.

## **1. Introduction**

Roll (1988) suggests that the timing and magnitude of changes in stock returns and volatility varies across markets around the world in response to major events. Nikkinen, Omran, Sahlstrom and Aijo (2008) confirm this in their study and show that the response of international markets to September 11, 2001, terrorist attack in the US differs according to the degree of each region's integration with the international market. Generally, periods with high volatility and dramatic movements in stock returns are found to be associated with important events in each country, rather than global events. The crash of 1987, however, proved to have a significant impact on several international markets (see Goodhart 1988, Malliaris and Urrutia 1992, Aggarwal, Inclan and Leal 1999). Along the same lines, the terrorist events of September 11 in the United States, and the subsequent attacks in Bali, Madrid, London and Mumbai have the potential to impact global business. As noted in the extant literature, terrorism and military attacks increase the cost of doing business because of added security measures and increased risks (Chen and Siem 2004). Ito & Lee (2004) show that terrorist attacks have considerable economic repercussions across the world. As such, there is the need to document their effects on stock returns.

In earlier studies, Chen and Siems (2004) and Richman, Santos and Barkoulas (2005) document negative reactions of international markets in response to September 11. Richman, Santos and Barcoulas (2005) further show short and long-term effects following the attack. Other studies have looked into the effects of the terrorist attack on industry portfolios. For instance, Drakos (2004) and Carter and Simkins (2004) investigate the effects of September 11 attacks on a set of airline stocks at various international stock markets and show an immediate impact on the world stock exchanges. Drakos (2004) documents an apparent shift in the riskiness of airlines stocks after the attack through an increase in systematic risk. Carter and Simkins (2004) find a negative reaction of both domestic and international airlines. Ito

and Lee (2005), on the other hand, note a substitution effect between domestic and international travel in Japan. They show an upward spike of 6 percent in the Japanese domestic demand and a dramatic drop of 8.9 percent in international demand after the September 11 event. Cam (2006) further observes a differential impact on industry portfolios in the US and shows that some industries were positively affected.

The extant literature, generally, lacks detailed evidence on how terrorism in foreign countries affects domestic securities. This paper, therefore, investigates the effect of the September 11 event and the later terrorist attacks on various Japanese industrial sectors. Generally, we expect the magnitude of the terrorist attacks on global markets to be pervasive given that globalisation has integrated financial markets. The choice of Japan in this study is justified by the fact that it was the first market to open following the initial and subsequent terrorist attack. As such, this study offers a unique insight into the immediate reactions of equity investors around these events. Moreover, Japan presents an ideal situation in which to examine economic integration and terrorism. For instance, although Japan has strong economic and political ties with the United States, we do not anticipate that all sectors of the Japanese and American systems are intimately linked. As such, we can still expect to observe differential impacts from major shocks such as the September 11 attacks.

Despite Japan offering these advantages for empirical research, the bulk of literature on terrorist attacks and the Japanese market has been limited. An examination of the literature shows that only the September 11 attack on the US has been examined in the Japanese equity context. However, there have been several terrorist attacks after September 11 in both Europe and Asia that the current literature does not address. This prior literature also suggests that only an overall Japanese market response and one industry (airline industry) have been examined. Moreover, the results of the airline industry study appear to be conflicting. For

example, Drakos (2004) argues a negative impact on the airline industry in Japan while Ito and Lee (2005) show a positive impact in the domestic airlines.

The extant literature may lead one to believe that terrorist attacks result in an increase in terrorist risk and, therefore, reflect a negative sentiment. We argue that such conclusions should not be drawn until one considers the industry effects of terrorist attacks in other nations as well as terrorist attacks that occurred post-September 11. To support our hypothesis, we study the impact of September 11 and subsequent four terrorist attacks that occurred in Bali, Madrid, London and Mumbai on the Japanese Stock Exchange. By observing the industry effects in Japan, we gain an understanding of investors' initial reactions to major terrorist attacks. Furthermore, we modify the methodologies used in the existing literature by excluding firm-specific information by using regression analysis and non-parametric tests to reinforce our findings. Most of the existing literature fails to exclude firm-specific information and, thus, report results containing both the impact of terrorist attacks and other non-terrorist components.

This study is also unique in the sense that it is the first study that looks at the short-term effects of five recent terrorist attacks on the different Japanese industries. Most of the current literature attempts to study the impact of one attack on the world capital markets, whereas we study how international terrorist attacks impact one country with differing economic links to the attack centers. This analysis is beneficial to portfolio managers who use the top-down investment process. The second stage of the top-down investment process is to deal with the factors influencing the industry; we contribute to this debate by adding the terrorist impact on the different industries. Moreover, global investors, as well as Japanese investors, can use this study as a guide to make their investment decisions in Japan in the event of another terrorist attack.

Consistent with the literature, we find significant negative abnormal returns associated with September 11 for both the Japanese market index and industrial

portfolios. On the other hand, our cumulative abnormal return over a five-day period shows that there are numerous sectors with negative returns, which is contrary to Chen and Siems (2004), who observed a market reversal after six days. The prior literature suggests inconsistent results in terms of changes in short-term risk. Drakos (2004) suggests an increase in short-term market risk in the airline industry, while Richman et al. (2005) find the opposite for the market index. We find theoretical consistency with Drakos (2004) in that systematic risk, for most of the Japanese industrial portfolios, increases immediately after the September 11 attack. We observe that one third of our results supports Richman et al. (2005) and Carter and Simkins (2004), who showed that there is no change in systematic risk in the long-term; the remaining of our findings show an increase in market risk.

A unique contribution of this study arises from the effect of terrorist attacks subsequent to September 11 on the Japanese equity market. We find that attacks occurring after September 11 had no impact on any sectors on the first trading day immediately following the incidents (with the exception of the banking sector from the Madrid Bombing). However, the cumulative abnormal return five days after the successive attacks suggest different outcomes. Half of the sectors studied (including the market index) exhibit a positive reaction five days after the Bali bombing. We note similar positive effects in four industries following the Madrid bombings. On the other hand, eight sectors are negatively affected five days after the Mumbai attack. Interestingly, we find no reaction to the London attack. In terms of short-term systematic risk, we generally observe no change in most sectors following the terrorist attacks. However, the events of September 11 show a distinct increase in systematic risk on the first day of trading for 75 percent of the industries. The automobile industry, however, exhibits an increase in market risk after Bali bombings. This increase in systematic risk is also noticed in the banking and insurance sectors following the Madrid attack. We only detect a long-term positive shift in market risk after the Bali and Madrid bombings.

The rest of the paper is structured as follows: In section 2, we present the data and methods used in this study. Section 3 presents the empirical findings and Section 4 concludes.

## **2. Data and Methodology**

### **2.1 Data**

We use daily stock return indexes and three-month treasury bills from the period July 1999 to February 2007 in our empirical analysis. Our total sample is comprised of 1859 stocks sourced from Datastream. Using the Global Industry Classification Standard, we categorise the individual stocks into 34 industrial groupings. Table 1 reports the descriptive statistics for each industry. It may be seen from the Table 1 that the average daily returns for ten sectors are significantly negative, while eleven sectors show significantly positive returns for the period under consideration. Table 1 also includes the standard deviation, skewness, excess kurtosis, and the number of firms in each of the industry sectors. Details of the five terrorist attacks that occurred in the United States, Bali, Madrid, London and Mumbai, and the first trading day subsequent to the attacks, are summarised in Table 2.

### **2.2 Methodology**

We employ event studies methodology in our empirical analysis and define daily return as:

$$DR_{it} = \ln\left(\frac{SRI_{it}}{SRI_{it-1}}\right) \quad (1)$$

where  $DR_{it}$  is the daily return for stock  $i$ ,  $SRI_{it}$  is the stock return index for stock  $i$  at time  $t$ , and  $SRI_{it-1}$  is the stock return index for stock  $i$  at time  $t-1$ . Following Brown and

Warner (1985), the *ex-post* abnormal returns ( $AR_{it}$ ) are calculated as the difference between observed returns of firm  $i$  at event day  $t$ , and the expected return,  $E(R_{it})$ :

$$AR_{it} = R_{it} - E(R_{it}) \quad (2)$$

The daily expected return,  $E(R_{it})$ , is estimated using a market model over the last 260 observed daily returns:

$$E(R_{it}) = \beta_0 + \beta_1 R_{mt} \quad (3)$$

The abnormal return for industry  $i$  at time  $t$ ,  $AR_{it}$ , is obtained by averaging the abnormal return of each firm within the industry:

$$AR_{it} = \frac{1}{N} \sum_{i=1}^N AR_{it} \quad (4)$$

### 2.3 Parametric Tests

The parametric tests used in this study rely on the important assumption that industry abnormal returns and cumulative abnormal returns are normally distributed.

The standard  $t$ -statistic for the abnormal return is given by:

$$t_{AR_{it}} = \frac{AR_{it}}{SD(AR_{it})} \quad (5)$$

where  $SD(AR_{it})$  is an estimate of the standard deviation of the abnormal returns. By cumulating the periodic abnormal return for each industry over five days, we obtain the five-day cumulative abnormal return,  $CAR5_{it}$ :



$$CAR5_{it} = \sum_{t=1}^5 AR_{it} \quad (6)$$

The  $t$ -statistic for the five-day cumulative abnormal return is obtained by dividing  $CAR5_{it}$  by the standard deviation of the five-day cumulative abnormal return,  $SD(CAR5_{it})$ :

$$t_{CAR5_{it}} = \frac{CAR5_{it}}{SD(CAR5_{it})} \quad (7)$$

#### 2.4 Non-Parametric Tests

The literature dealing with abnormal returns shows that these returns are not normally distributed. Specifically, the distribution of the abnormal returns tends to exhibit fat tails and positive skew. Under these circumstances, parametric tests are likely to reject the null too often when testing for positive abnormal performance and too seldom when testing for negative abnormal returns. As a robustness test, we turn to an alternative non-parametric test developed by Corrado (1989). This test is more powerful at detecting the false null hypothesis of no abnormal returns. We transform each firm's abnormal returns,  $AR_{it}$  into ranks,  $K_i$ , over the combined period,  $T_i$ , of 260 days. This is denoted as:

$$K_i = rank(AR_{it}) \quad (8)$$

The period is broken up into the 244 days prior to the event, the event day and 15 days following the event. The ranks in the event period for each firm are then compared with the expected average rank,  $\bar{K}_i$ , under the null hypothesis of no

abnormal returns. This is given by:

$$\bar{K}_i = 0.5 + \frac{T_i}{2} \quad (9)$$

The non-parametric  $t$ -statistic,  $t_{np}$ , for the null hypothesis of no abnormal returns for each industry is given by:

$$t_{np} = \frac{\frac{1}{N} \sum_{i=1}^N (K_i - \bar{K}_i)}{SD(\bar{K})} \quad (10)$$

where  $SD(\bar{K})$  is the standard deviation of the average rank, and is denoted by:

$$SD(\bar{K}) = \sqrt{\frac{1}{T} \sum_{t=1}^T \frac{1}{N^2} \sum (K_{it} - \bar{K}_i)^2} \quad (11)$$

## 2.5 Regression Analysis

Using the CAPM, we test if terrorist attacks have had an impact on the systematic risk of Japanese industries on the days of the attack. We include a multiplicative dummy variable in the standard CAPM to test this possibility. The model we estimate is:

$$\tilde{r}_{it} - \tilde{r}_{ft} = \phi_I + \beta_I^1 [\tilde{r}_{mt} - \tilde{r}_{ft}] + \beta_I^2 [\tilde{r}_{mt} - \tilde{r}_{ft}] * D + \tilde{\epsilon}_{it} \quad (12)$$

where  $\tilde{r}_{it}$  is industry  $I$ 's return at time  $t$ ,  $\tilde{r}_{ft}$  is risk free return at time  $t$ ,  $\tilde{r}_{mt}$  is return on the market at time  $t$  and  $D$  is a dummy variable that takes the value of 1 on the day of the event, and 0 otherwise. This variable captures the effect of terrorist attacks on systematic risk. The inclusion of an additive dummy variable in equation 12, results in a near singular variance-covariance matrix. As a result, we estimate a separate equation to test if the intercept was affected by the attacks:

$$\tilde{r}_{it} - \tilde{r}_{ft} = \varphi_I + \alpha_I^1 [\tilde{r}_{mt} - \tilde{r}_{ft}] + \alpha_I^2 D + \tilde{\varepsilon}_{it} \quad (13)$$

We use the returns for each industry 244 days prior to the event, and 15 days after the event. Standard tests and residual diagnostics revealed no major concerns with the two econometric models in equation 12 and equation 13. Using a Wald test, we check whether the dummy variables are redundant.

Further, we consider the long-term impact of the terrorist events on the market. The test determines whether the level of risk, specifically captured by structural changes, is altered after the event day:

$$\tilde{r}_{it} = \varphi_I + \delta_I^1 [\tilde{r}_{mt} - \tilde{r}_{ft}] + \delta_I^2 [\tilde{r}_{mt} - \tilde{r}_{ft}] * SD + \delta_I^3 SD + \tilde{\varepsilon}_{it} \quad (14)$$

where  $SD$  is a structural dummy variable that takes the value of 0 prior to the event, and 1 after the day of the event. This variable captures the structural changes and influence of terrorist attacks on systematic risk over a long-term horizon.

### 3. Empirical Findings

We report the results of the impact of the five different terrorist attacks detailed in Table 2 on the Japanese Stock Exchange in this section. Using parametric and non-parametric tests we investigate whether the returns and

systematic risk of 34 Japanese industries were affected by these five events. The results confirm that there is a strong negative impact on returns for most of the industries and a general increase in systematic risk of some industries on the first day of trading following the US September 11 attacks. We further document a general increase in the long-term systematic risk for some Japanese industrial sectors. Interestingly, we do not find similar evidence for each of the subsequent four attacks. However, market risk increases in the long-term after the September 11, Bali and Madrid attacks. We also note that the Bali bombings have a positive impact on the returns of 17 Japanese industries five days after the attack, while eight industrial sectors reacted negatively to the Mumbai attacks. The London bombings, on the other hand, had no impact on the Japanese market. We discuss the results of the individual terrorist events below.

### **United States Attacks – 11 September 2001**

Table 3 and Table 4 summarise the parametric empirical results for September 11 for the different Japanese industrial sectors. We report the abnormal return on the first day of trading following the attacks and the five-day cumulative abnormal return, as well as their respective *t*-statistics for the 34 different industries. It should be noted that, unlike the US market that opened six days after the attack, the Japanese market opened the day after the attack. In other the words, we are assessing the performance of the Japanese stock market on September 12, 2001. The results reported in Table 3 and Table 4 show a consistent negative effect on equities listed in the Japanese Stock Exchange following the September 11 attack. Figure 1 supports this hypothesis, except for the telecommunication, gas and oil, and aerospace industries.

Columns two and three of Table 3 report the abnormal returns and the parametric *t*-statistics for the various sectors. With the exceptions of aerospace, gas and oil, and general financials, all the other industries exhibited a negative and

statistically significant abnormal return on the first trading day after the September 11 attacks. In other words, 31 out of 34 sectors were affected by the event. The equity and non-equity investment sector, which fell by 9.67 percent, was the industry most affected in the short-term. However, our results show a rebound for this sector after five trading days (see Table 4).

Chen and Siems (2004) assess the short-term effect of September 11 on the global capital market and the banking sectors. They document a fall of 6.2 percent and 6.3 percent for the market and banking sectors, respectively, after the attacks. Richman et al. (2005), supporting Chen and Siems (2004), find a negative impact of 6.5 percent for the Japanese stock market. Consistent with Chen and Siems (2004) and Richman et al. (2005), we observe a decrease of 5.5 percent on the market index. It should be noted that we exclude firms with firm-specific information surrounding the terrorist events. This may account for the reduced value that we report relative to the results of Chen and Siems (2004) and Richman et al. (2005). Furthermore, the Japanese banking sector, after excluding firm-specific information, shows a drop of 2.25 percent. Carter and Simkins (2004) and Drakos (2004) demonstrate a 10 percent to 16 percent decline in Japanese airline businesses immediately after the attack. Our result for the travel and leisure industry confirms this drop, albeit, it is a drop of only 3.9 percent. Generally, our findings on the effect of the terrorist attacks on Japanese industrial portfolios show a clear and consistent fall in various industries in Japan.

The cumulative abnormal returns suggest that 17 industrial groupings experience negative returns while one sector, aerospace, reports positive cumulative abnormal returns over the five trading days following September 11 (see Table 4). The second column of Table 4 shows that the life and non-life Insurance sector was the worst performing sector, with -10.31 percent as CAR5. Over the five-day period, the automobile, leisure goods, life and non-life Insurance, and travel and leisure experiences deterioration while the remaining sectors show a rebound. Chen and

Siems (2004) find that both the market and the banking sector rebound after six days. We document a five-day rebound for the banking sector and observe a -4.48 percent CAR5 for the entire Japanese market (see Table 4).

Table 5 presents results of the non-parametric tests conducted as a robustness check. Analogous to the parametric tests, the negative impact of the events of September 11 on Japanese industries is also detected by the non-parametric tests. This is represented by the negative non-parametric  $t$ -statistics. The general conclusion that can be drawn from the above discussion is that the September 11 attacks resulted in an adverse impact on Japanese industrial sectors.

A general assumption is that, following a terrorist attack, returns of equities fall as a result of an increase in systematic risk. We, thus, conduct an empirical test to determine if the industries negatively affected by the events of September 11 experience a general increase in their systematic risk on the first trading day following the terrorist attacks using the multiplicative regression analysis in equation 12. Columns two to four of Table 6 report the results of the multiplicative dummy variable model (equation 12). A positive (negative) coefficient of the multiplicative dummy variable ( $\beta_i^2$ ) reflects an increase (decrease) in systematic risk on the first trading day. The sign of the coefficient ( $\beta_i^2$ ) is positive for all of the industries included in the study, with the exception of aerospace and gas and oil. When the coefficient of the multiplicative dummy variable is statistically different from zero, it implies a significant statistical change in the systematic risk of the industry. The  $t$ -statistics results from column four of Table 6 shows that systematic risk statistically increased in 26 sectors.<sup>1</sup> Excluding general financial, the remaining 25 sectors recorded a statistical decrease in abnormal returns on the first trading day. For

---

<sup>1</sup>Automobile, Beverages, Chemicals, Construction, Electronics, Engineering, E & N Investments, Food and Drug, Forest, General Financial, General Industrial, Health Care, Household Goods, Industrial Transportation, Leisure Goods, Life and Non-Life Insurance, Metal, Personal Goods, Pharmaceuticals, Real Estate, Retailers, Software, Support Service, Technology, Telecommunication, and Travel and Leisure sectors.

example, the systematic risk of pharmaceuticals was 0.16 (see column three of Table 6) prior to the attack and increased to 1.86 (see column four of Table 6) immediately after the attack. The general increase in systematic risk of 1.73<sup>2</sup> can be attributed to the terrorist risk. This may explain the fall in abnormal returns of the stock. For completeness purposes, we estimate equation 13 to test if the intercept of the excess return CAPM has changed. We find a decrease in the intercept term of the excess return CAPM for the 26 industries identified above.

In estimating equations 12 and 13, we only show the short-term impact of the September 11 attacks on the Japanese industrial sectors. In applying equation 14, we can observe the long-term impact of this terrorist attack; that is we can test if the increase in systematic risk observed on the first trading day after the event persists in the long-term. The results, presented in Table 7, column four, show that 70 percent of industries exhibit an increase in systematic risk in the long run. For example, the systematic of the chemicals industry increased by 0.38 after the September 11 attacks.

### **Bali Bombings – 12 October 2002**

Table 3 and Table 8 show the effect of Bali bombings on abnormal returns and systematic risk, respectively, for Japanese industries on the first day of trading following the bombings. The actual attacks occurred on the Saturday, October 12, 2002, and the first day of trading in Japan was on October 14, 2002. Columns three and four of Table 3 report the abnormal returns and the parametric *t*-statistics for the various sectors. In contrast to the September 11 results, this event did not have any immediate effect on the abnormal returns nor the systematic risks of the Japanese equity industries. The results of the non-parametric robustness tests in Table 5 also

---

<sup>2</sup> Wald test was carried out for all of the industries to test if the coefficient of the multiplicative variable ( $\beta_i^2$ ) is redundant. The results, not reported, show that the terrorist systematic risk ( $\beta_i^2$ ) is a significant factor.

support these findings. Our analysis on how terrorist risk changes systematic risk on the first day of trading reveals no effect, with the exception of the automobile industry, which recorded an increase in risk (see Table 8).

We also observe a slow response of the Japanese market to this event. For five trading days after the bombings, 17 industries experience positive returns as shown in the cumulative abnormal return in Table 4. As could be seen in columns four and five of Table 4, the telecommunications industry registered the highest positive CAR5 (10.89 percent), while the food production industry recorded the lowest positive CAR5 of 2.86 percent. We are not the first to identify such a reaction, as Ito and Lee (2005) detect a shift away from international travels and toward domestic travel in Japan and Canada following September 11.

Consistent with the expected increase in systematic risk following a terrorist attack, we observe an increase in the long-term systematic risk of 31 sectors in Japan; for example, as shown in Table 9, systemic risk increases in the automobile and engineering industries by 0.33 and 0.47, respectively.

#### **Madrid – 11 March 2004**

The Madrid bombings occurred on Thursday, March 11, 2004. We examine the Japanese industry reactions both immediately and five days following the event. The results of the parametric test immediately after the attacks and five days after the attacks are shown in columns six and seven of Table 3 and Table 4, respectively. We find weak evidence that the Madrid bombings had a negative impact on Japanese industries in the first trading day, where only the banking industry fell by 1.68 percent. A positive CAR5 can be detected in construction, food and drug, household goods, and retailers industries. We further observe an increase in systematic risk following the Madrid attacks for the Japanese banking and insurance industries on the first trading day (see Table 10). In the long-term, we show an increase in systematic risk



for 16 industries in Table 11. That is to say, the Madrid bombing had a pronounced long-term effect but only minimal short-term impact.

### **London – 7 July 2005**

On Thursday, July 7, 2005, London was subjected to terrorist attacks. Surprisingly, following the attacks, the Japanese stock market's response to the attack is insignificant on both returns and systematic risks.<sup>3</sup> The abnormal returns on the first trading day and cumulative abnormal returns are not statistically different from zero, implying that Japanese industries were insensitive to the London attacks. The non-parametric *t*-statistic also supports these findings. Once more, the London evidence shows that it is wrong to assume that terrorist attacks will negatively impact stock markets.

### **Mumbai – 11 July 2006**

Analogous to the Bali bombings, we find that the Japanese industrial segments reacted cautiously to the Mumbai bombings. Whereas there is no effect detected on the first trading day for all industries in both returns and systematic risks, we show a negative CAR5 for eight industries (see Table 4). Similar to the response engendered by the US terrorist attacks, this negative effect was more pronounced in the life and non-life Insurance. We also find no change in the long-term systematic risk of the Japanese industries.

## **4. Conclusion**

The literature generally notes that terrorism and military attacks increase the cost of doing business because of added security measures and increased risks. Market reactions as a whole has been extensively studied, however, only a handful of papers have investigated specific sectors and the impacts of terrorism on domestic

---

<sup>3</sup> These results, though available, are not reported for the sake of brevity.

securities in foreign countries. Even then, only the banking and airline industries have been extensively studied. Additionally, the extant literature shows a dearth of studies on the terrorist attacks after September 11. In this paper, we analyse the fallout on the Tokyo Stock Exchange following five recent terrorist attacks. Using the event study methodology, we assess the impact of these terrorist attacks on all Japanese industrial sectors. Japan is of enormous interest because we are able to analyse the initial reaction of investors immediately after the September 11 attacks.

Our results show that the events of September 11 had the greatest effect on the Japanese market. The majority of the industries were down on the first trading day, and fifty percent of the industries were still negatively affected five days following the event. We also demonstrate an increase in systematic risk of these sectors in both the short- and long-run following the attacks. On the other hand, we find that the Japanese sectors were insensitive to the Mumbai and London bombings. Interestingly, we find that some Japanese industries reacted positively to the Bali bombings. Further, we only detect a weak response from the Madrid attacks.

## **References**

- Aggarwal, R., Inclan, C., & Leal, R. (1999). Volatility in emerging stock markets. *Journal of Financial and Quantitative Analysis*, 34, 33–55.
- Brown, S. J., & Warner, J. B. (1985). Using daily stock returns: The case of event studies. *Journal of Financial Economics*, 14, 3-31.
- Cam, M. (2006). The impact of terrorism on United States industry indexes. Working Paper, Royal Melbourne Institute of Technology, Melbourne.

- Carter, D. A., & Simkins, B. J. (2004). The market's reaction to unexpected, catastrophic events: the case of airline stock returns and the September 11th attacks. *The Quarterly Review of Economics and Finance*, 44, 539–558.
- Chen, A. H., & Siems, T. F. (2004). The effects of terrorism on global capital markets. *European Journal of Political Economy*, 20, 349-366.
- Corrado, C. J. (1989). A non parametric test for abnormal security price performance in event studies. *Journal of Financial Economics*, 23, 385-395.
- Drakos, K. (2004). Terrorism-induced structural shifts in financial risk: airline stocks in the aftermath of the September 11<sup>th</sup> terror attacks. *European Journal of Political Economy*, 20, 435–446.
- Goodhart, C. (1988). The international transmission of asset price volatility. *Financial market volatility*, 79–132. Federal Reserve Bank of Kansas City.
- Ito, H., & Lee D. (2005). Comparing the Impact of the September 11<sup>th</sup> Terrorist Attacks on International Airline Demand. *International Journal of the Economics of Business*, 12, 225-249.
- Malliaris, A., & Urrutia, J. (1992). The international crash of October 1987: Causality tests. *Journal of Financial and Quantitative Analysis*, 27, 353–363.
- Nikkinen, J., Omran M. M., Sahlstrom P. & Aijo J. (2008). Stock returns and volatility following the September 11 attacks: Evidence from 53 equity markets. *International Review of Financial Analysis*, 17, 27–46.

Richman, V., Santos M. R., & Barkoulas J. T. (2005). Short- and Long-Term effects of the September 11 Event: The International Evidence. *International Journal of Theoretical and Applied Finance*, 8, 947-958.

Roll, R. (1988). The International Crash of October 1987. In R. Kamphius, R. Kormendi, & J. Waston (Eds.), *Black Monday and the future of financial markets*. Mid-American Institute.

**Table 1: Descriptive Statistics of Daily Returns for Japanese Industrial Sectors From July 1999 to February 2007**

<b>Return</b>	<b>Mean (%)</b>	<b>Stdev</b>	<b>Skewness</b>	<b>Excess Kurt</b>	<b>Min (%)</b>	<b>Max (%)</b>	<b>Count</b>	<b>T-Test Statistic</b>	<b>JB-Statistic</b>
Aerospace	0.0451	0.0004	1.98	3.97	0.02	0.12	6	2.73	5
Automobiles	0.0146	0.0006	-2.91	14.46	-0.35	0.14	75	2	115
Banks	0.0101	0.0004	0.91	16.15	-0.16	0.25	75	2.01	21
Beverages	-0.0469	0.0016	-3.01	9.58	-0.53	0.05	12	-1.03	22
Chemical	0.0118	0.0008	-4.52	28.38	-0.53	0.17	75	1.26	289
Construction	0.0037	0.0005	0.23	2.06	-0.13	0.15	73	0.69	1
Electricity	0.0477	0.0004	2.83	8.72	0.02	0.15	12	4.75	19
Electronics	-0.0266	0.001	-2.5	7.88	-0.52	0.11	75	-2.21	81
Equity and Non-Equity Investment	0.0227	0.0005	-0.6	2.53	-0.09	0.13	16	1.76	1
Food Product	0.0072	0.0004	-1.7	6.75	-0.18	0.11	75	1.53	38
Food & Drug	-0.0058	0.0009	-1.97	5.64	-0.36	0.17	75	-0.57	50
Forest	0.0056	0.0002	-0.35	0.89	-0.04	0.05	24	1.51	1
Gas	0.0158	0.0003	-1.15	1.85	-0.07	0.06	22	2.27	5
Oil & Gas	0.0461	0.0005	1.27	1.57	-0.01	0.18	16	3.67	4
General Industrial	0.0077	0.0003	-0.52	1.52	-0.09	0.07	33	1.33	2
General Financial	0.0087	0.0023	3.17	17.33	-0.48	1.25	72	0.32	133
Health Care	-0.0062	0.0009	-0.11	1	-0.24	0.25	68	-0.57	0
Household Goods	-0.0084	0.0009	-2.43	9.32	-0.47	0.17	75	-0.81	77
Industrial Transportation	0.0193	0.0005	-1.4	3.68	-0.16	0.1	74	3.64	25
Leisure Goods	-0.0452	0.0016	-3.37	13.43	-0.9	0.14	68	-2.29	136
Life & Non-Life Insurance	-0.1413	0.0055	-3.17	10.24	-1.77	0.08	11	-0.86	23
Media	-0.1228	0.0025	-2.88	10.02	-1.35	0.11	74	-4.28	106

Metal	0.0388	0.0005	-0.5	2.68	-0.12	0.15	74	7.45	3
Personal Goods	0.0167	0.0005	0.71	2.94	-0.08	0.2	74	3.1	7
Pharmaceuticals	-0.0037	0.0009	-1.83	3.66	-0.34	0.15	67	-0.32	38
Real Estate	0.0506	0.0014	-1.5	5.98	-0.58	0.36	75	3.19	30
Retailers	-0.0253	0.0011	-1.31	3.74	-0.45	0.27	74	-1.96	22
Software	-0.1003	0.0022	-2.3	6.78	-1.04	0.32	72	-3.95	66
Support Service	-0.0756	0.0021	-1.84	3.7	-0.83	0.25	75	-3.17	43
Technology	-0.0413	0.0019	-0.46	10.58	-0.84	0.84	75	-1.89	7
Telecommunication	-0.0467	0.001	-1.11	0.86	-0.27	0.08	14	-1.81	3
Travel & Leisure	-0.041	0.0018	-2.66	8.3	-0.84	0.19	72	-1.98	88
Others	0.0164	0.0004	-0.63	-1.07	-0.05	0.06	6	0.95	0
ALL	0.012	0.0014	-3.11	33.42	-1.77	1.25	1859	-3.7	90641

**Table 2: Five Terrorist Attacks and Their Consequences**

<b>Terrorist Attack</b>	<b>Date</b>	<b>Event</b>	<b>First Trading Day</b>	<b>Injuries</b>	<b>Fatalities</b>
September 11 - United States	11/09/2001	Four US planes hijacked by terrorists crashed into the World Trade Center, the Pentagon and a field in Pennsylvania, killing nearly 3,000 people in a matter of hours.	12/09/2001	5,000	3,025
Bali Bombings – Indonesia	12/10/2002	Two deadly explosions, one detonated by a suicide bomber and the other carried out by a large van, ripped through two popular nightclubs, Sari Club and Padi's Bar, in Kuta on the island of Bali, killing 202 people, most of them young Australians, and injuring more than 300.	14/10/2002	300	202
Madrid - Spain	11/03/2004	A series of coordinated bombings against the commuter train system that left 191 dead and 1,824 injured in Madrid, Spain.	12/03/2004	1,824	191
London - United Kingdom	07/07/2005	At the peak of the rush hour, bombs were detonated in three crowded subway trains and aboard a London bus, killing at least 52 people and injuring 700.	08/07/2005	700	52
Mumbai - India	11/07/2006	A series of seven bombings that took place over a period of 11 minutes on the suburban railways in Mumbai, with 209 dead and over 714 injured.	11/07/2006	714	209

*Source: Adapted and adjusted from Cam (2006) and various media releases.*

**Table 3: Abnormal Returns on Japanese Industry Indices Following Five Terrorist Attacks**

*This table presents abnormal returns and the parametric t-test results for 34 Japanese industries after the September 11, Bali, Madrid, London and Mumbai terrorist attacks.*

Industry	11-Sept.		Bali		Madrid		London		Mumbai	
	AR (%)	T-Stat	AR (%)	T-Stat	AR(%)	T-Stat	AR (%)	T-Stat	AR (%)	T-Stat
Aerospace	0.80	0.55	0.10	0.05	0.45	0.33	-1.47	-1.37	-1.27	-0.70
Automobile	-6.10**	-7.13	0.02	0.03	-0.27	-0.37	-0.11	-0.19	-0.53	-0.52
Banks	-2.25**	-2.67	0.05	0.04	-1.68*	-1.93	0.32	0.45	-0.54	-0.39
Beverages	-6.20**	-6.81	0.11	0.15	-0.46	-0.78	-0.47	-0.86	-0.65	-0.88
Chemicals	-6.21**	-6.99	0.05	0.06	-0.38	-0.52	0	0	-0.58	-0.54
Construction	-4.65**	-6.24	0.16	0.2	-0.09	-0.13	-0.23	-0.39	-0.59	-0.56
Electricity	-3.70**	-3.91	0.07	0.08	-0.49	-0.90	-0.13	-0.26	-0.77	-0.80
Electronics	-5.57**	-4.56	0.09	0.09	-0.32	-0.30	0.36	0.52	-0.76	-0.61
Engineering	-6.42**	-6.38	0.09	0.10	-0.18	-0.21	-0.32	-0.48	-1.20	-0.89
Equity & Non-Equity Investment	-9.67**	-6.01	0.06	0.04	-1.15	-0.97	-0.02	-0.03	-0.32	-0.29
Food Producers	-3.48**	-6.69	0.09	0.19	0.16	0.36	0.18	0.42	-0.69	-1.04
Food & Drug	-3.39**	-5.91	0.03	0.06	-0.26	-0.63	-0.02	-0.05	-0.56	-0.75
Forest	-4.41**	-4.76	0.05	0.06	-0.80	-1.17	-0.23	-0.4	-0.25	-0.28
Gas	-2.71**	-3.47	0.19	0.27	-0.71	-1.39	0.10	0.22	-0.40	-0.51
Gas and Oil	-1.27	-0.78	0.40	0.31	-1.24	-1.19	-0.78	-0.77	-1.09	-0.75
General Industrial	-6.38**	-6.48	0.07	0.06	-0.46	-0.55	0.49	0.72	-0.60	-0.56
General Financial	-6.00	-0.48	0.19	0.15	-1.24	-0.82	0.11	0.12	-0.95	-0.51
Health Care	-5.53**	-6.01	0.11	0.15	0.68	0.91	0.38	0.56	0.21	0.21
Household Goods	-6.07**	-8.37	0.05	0.07	2.50	0.37	-0.08	-0.15	-0.12	-0.11
Industrial Transportation	-4.24**	-5.6	0.04	0.06	-0.87	-1.26	-0.15	-0.23	-0.44	-0.47



Leisure Goods	-7.16**	-5.81	0.07	0.06	-0.55	-0.54	-0.37	-0.49	-1.19	-0.90
Life & Non-Life Insurance	-8.38**	-5.97	0.10	0.06	-2.77	-1.57	-0.26	-0.21	-0.98	-0.49
Media	-4.68**	-3.39	0.18	0.17	0.03	0.02	-0.32	-0.37	-1.49	-0.88
Metal	-7.36**	-6.49	0.12	0.10	-0.84	-0.64	-0.10	-0.10	-1.67	-1.04
Personal Goods	-7.08**	-7.69	0.10	0.11	-0.24	-0.30	-0.43	-0.64	-0.63	-0.54
Pharmaceuticals	-6.88**	-7.12	0.05	0.06	-0.67	-0.98	0.06	0.09	-0.67	-0.67
Real Estate	-8.72**	-6.38	0.38	0.35	0.89	0.76	0.10	0.11	-1.88	-1.21
Retailers	-4.91**	-5.66	0.04	0.05	-0.24	-0.36	0.06	0.09	-0.64	-0.53
Software	-8.05**	-4.33	0.26	0.21	-0.08	-0.05	-1.10	-1.00	-2.57	-1.25
Support Service	-6.38**	-6.26	0.16	0.20	-0.67	-0.71	-0.48	-0.55	-0.99	-0.61
Technology	-7.92**	-4.95	0.13	0.10	-1.04	-0.83	-0.03	-0.04	-1.14	-0.77
Telecommunication	-6.56**	-2.51	0.17	0.08	-1.20	-0.52	-0.59	-0.38	-2.39	-1.11
Travel & Leisure	-3.90**	-5.81	0.30	0.53	-0.12	-0.21	0.03	0.04	-0.42	-0.41
Others	-4.01**	-2.46	0.27	0.15	-2.04	-0.91	0.12	0.08	-0.17	-0.08
ALL	-5.57**	-6.82	0.11	0.15	-0.42	-0.59	-0.10	-0.16	-0.85	-0.74

\*Significance at 10% level

\*\*Significance at 5% level

**Table 4: Cumulative Abnormal Returns for Five Days on Japanese Industry Indices Following Five Terrorist Attacks**

*This table presents five-day cumulative abnormal returns and the parametric t-test results for 34 Japanese industries after the September 11, Bali, Madrid, London and Mumbai terrorist attacks.*

Industry	11-Sept.		Bali		Madrid		London		Mumbai	
	CAR5(%)	T-Stat	CAR5 (%)	T-Stat	CAR5 (%)	T-Stat	CAR5 (%)	T-Stat	CAR5 (%)	T-Stat
Aerospace	6.27**	2.09	4.24	1.05	5.98	1.55	-0.79	-0.31	-3.62	-0.88
Automobile	-8.96**	-3.94	4.89**	2.20	0.07	0.04	1.10	0.76	-3.89	-1.47
Banks	-2.08	-1.14	3.00	1.23	2.29	1.11	-0.24	-0.15	-4.37	-1.28
Beverages	-3.86*	-1.81	2.72	1.57	1.45	1.05	0.34	0.25	-3.31**	-2.08
Chemicals	-4.98**	-2.10	2.97	1.35	1.75	0.83	0.49	0.32	-4.50*	-1.65
Construction	-3.58*	-1.72	1.82	0.89	4.65**	2.20	-0.44	-0.28	-4.61*	-1.75
Electricity	-1.04	-0.52	1.31	0.69	0.52	0.43	0.04	0.04	-4.20**	-2.07
Electronics	-2.29	-0.72	5.34*	1.92	1.27	0.42	2.72	1.48	-5.51*	-1.81
Engineering	-5.40**	-2.08	4.11*	1.72	2.74	1.11	0.59	0.35	-5.32	-1.60
Equity & Non-Equity Investment	-2.71	-0.86	5.78	1.26	1.43	0.46	0.86	0.55	-3.99	-1.53
Food Producers	-2.98**	-2.32	2.86**	2.04	1.83	1.57	0.70	0.61	-2.46	-1.56
Food & Drug	-2.33	-1.51	0.80	0.64	2.24**	2.22	0.98	0.91	-2.41	-1.26
Forest	-3.12	-1.39	0.78	0.37	0.90	0.54	0.30	0.21	-2.55	-1.22
Gas	-2.65	-1.73	0.24	0.15	1.75	1.55	-0.15	-1.39	0.26	-1.35
Gas and Oil	2.10	0.53	5.56*	1.88	1.63	0.71	-1.43	-0.56	0.26	0.08
General Industrial	-4.12	-1.57	3.19	1.25	1.44	0.66	1.02	0.57	-4.32*	-1.66
General Financial	-4.74	-1.32	5.93*	1.77	4.88	1.19	0.66	0.30	-6.03	-1.38
Health Care	-1.85	-0.72	4.38**	1.98	1.25	0.91	1.38	0.79	-3.45	-1.36
Household Goods	-4.66**	-2.36	2.81	1.44	3.72**	2.02	0.20	0.14	-3.02	-1.16

Industrial Transportation	-5.06**	-2.51	2.00	1.12	2.69	1.39	0.58	0.34	-3.69	-1.58
Leisure Goods	-8.84**	-2.83	5.16	1.78	0.20	0.07	1.18	0.64	-5.66*	-1.74
Life & Non-Life Insurance	-10.31**	-3.21	1.70	0.48	4.17	1.10	-0.13	-0.05	-7.36*	-1.70
Media	-4.44	-1.19	6.20**	2.24	0.12	0.03	1.56	0.67	-5.65	-1.36
Metal	-5.16*	-1.68	4.77	1.26	2.26	0.61	-0.34	-0.13	-5.66	-1.44
Personal Goods	-4.34*	-1.83	3.58	1.40	2.64	1.07	1.24	0.68	-4.33	-1.49
Pharmaceuticals	-3.36	-1.41	4.99**	2.30	-0.14	-0.08	0.89	0.54	-2.89	-1.27
Real Estate	-6.16*	-1.81	5.76*	1.85	3.32	1.02	2.72	1.09	-5.42	-1.46
Retailers	-4.25*	-1.71	3.88**	2.09	3.27	1.76	1.75	0.97	-4.97	-1.63
Software	-6.99	-1.34	7.10**	1.99	1.06	0.22	1.56	0.53	-6.58	-1.29
Support Service	-6.00**	-2.20	4.59*	1.79	0.08	0.03	0.44	0.19	-4.91	-1.21
Technology	-6.80	-1.62	6.61*	1.81	-0.27	-0.07	1.34	0.65	-6.12	-1.64
Telecommunication	3.85	0.57	10.89**	2.21	-0.94	-0.16	3.39	0.91	-6.53	-1.29
Travel & Leisure	-5.33**	-3.13	2.51*	1.75	1.18	0.72	1.12	0.72	-3.63	-1.40
Others	-1.54	-0.41	5.13	1.10	2.52	0.49	-0.32	-0.09	-4.31	-0.90
All	-4.48**	-2.03	3.94*	1.90	1.90	0.91	0.87	0.57	-4.46	-1.58

\*Significance at 10% level

\*\* Significance at 5% level

**Table 5: Impact of Five Terrorist Attacks on Japanese Industry Indices- Non-Parametric Results**

*This table presents the non-parametric t-test results for 34 Japanese industries after the September 11, Bali, Madrid, London and Mumbai terrorist attacks.*

<b>Industry</b>	<b>11-Sep</b>	<b>Bali</b>	<b>Madrid</b>	<b>London</b>	<b>Mumbai</b>
Aerospace	-0.74	0.57	-0.13	-1.07	-0.86
Automobile	-3.92**	-0.14	-1.22	-0.52	-0.51
Banks	-2.22**	0.02	-2.09**	0.80	-0.20
Beverages	-3.89**	0.50	-1.48	-0.65	-1.09
Chemicals	-3.98**	0.30	-1.16	-0.06	-0.49
Construction	-4.31**	0.24	-0.84	-0.01	-0.29
Electricity	-2.27**	0.37	-0.97	-0.29	-0.89
Electronics	-3.20**	0.16	-0.94	0.12	-0.89
Engineering	-4.12**	0.56	-1.28	-0.34	-1.10
Equity & Non-Equity Investment	-1.69*	-0.11	-1.64	-0.10	-0.57
Food Producers	-4.34**	0.91	-0.55	0.82	-0.76
Food & Drug	-4.39**	-0.24	-1.68*	0.36	-0.47
Forest	-2.72**	0.48	-1.82*	-0.25	0.22
Gas	-3.02**	0.51	-2.48**	0.46	-0.59
Gas and Oil	-0.87	-0.08	-1.87*	-1.42	-0.50
General Industrial	-4.06**	-0.46	-1.10	0.68	-0.65
General Financial	-3.05**	0.81	-1.48	0.22	-0.69
Health Care	-3.34**	0.43	-1.35	-0.08	0.10
Household Goods	-4.21**	0.01	-0.82	-0.20	-0.05
Industrial Transportation	-3.41**	0.55	-1.87	0.55	-0.34
Leisure Goods	-3.64**	0.21	-0.97	-1.09	-0.85
Life & Non-Life Insurance	-2.69**	-0.20	-2.07**	-0.36	-0.42
Media	-3.22**	0.93	-1.24	-0.79	-0.89
Metal	-3.80**	0.41	-1.38	-0.05	-1.01
Personal Goods	-4.75**	0.59	-1.28	-0.68	-0.35
Pharmaceuticals	-4.51**	0.21	-1.70	0.15	-0.15
Real Estate	-3.86**	0.24	-0.47	-0.51	-1.76
Retailers	-4.48**	0.40	-1.46	-0.22	-0.94
Software	-3.27**	0.51	-0.94	-0.76	-1.41
Support Service	-4.06**	1.10	-2.06**	-0.87	-0.94
Technology	-3.46**	0.19	-1.41	-0.51	-1.15
Telecommunication	-1.98**	0.20	-1.09	-0.69	-1.55
Travel & Leisure	-4.60**	0.36	-1.03	-0.71	-0.67
Others	-2.06**	0.70	-2.12**	0.45	-0.20
ALL	-4.41**	0.40	-1.63	-0.24	-0.76

\*Significance at 10% level

\*\* Significance at 5% level

**Table 6: The Short-Run Impact of September 11 attacks on the Systematic Risk of Japanese Industries**

*This table presents the regression analysis results for 34 Japanese industries after the September 11 terrorist attack (see equation 12 and 13). The first multiplicative dummy variable equation illustrates the impact on systematic risk and the second additive dummy variable equation shows the impact on the intercept.*

Industry	$\tilde{r}_i - \tilde{r}_j = \phi_1 + \beta_1^1[\tilde{r}_i - \tilde{r}_j] + \beta_1^2[\tilde{r}_m - \tilde{r}_j] * D + \tilde{\varepsilon}_i$			$\tilde{r}_i - \tilde{r}_j = \phi_1 + \alpha_1^1[\tilde{r}_m - \tilde{r}_j] + \alpha_1^2 D + \tilde{\varepsilon}_i$		
	$\phi_1$	$\beta_1^1$	$\beta_1^2$	$\phi_1$	$\alpha_1^1$	$\alpha_1^2$
Aerospace	-0.05	0.08	-0.77	-0.05	0.08	0.22
<i>T-Statistics</i>	-31.27	1.17	-1.15	-31.27	1.17	1.15
Automobile	-0.05	0.15	1.48**	-0.05	0.15	-0.04**
<i>T-Statistics</i>	-41.84	3.13	3.02	-41.84	3.13	-3.02
Banks	-0.05	0.13	0.21	-0.05	0.13	-0.01
<i>T-Statistics</i>	-39.43	2.51	0.40	-39.43	2.51	-0.40
Beverages	-0.05	0.12	1.55**	-0.05	0.12	-0.05**
<i>T-Statistics</i>	-39.45	2.25	2.96	-39.45	2.25	-2.96
Chemicals	-0.05	0.15	1.51**	-0.05	0.15	-0.05**
<i>T-Statistics</i>	-40.53	2.91	2.97	-40.53	2.91	-2.97
Construction	-0.05	0.14	1.01**	-0.05	0.14	-0.03
<i>T-Statistics</i>	-41.35	2.86	2.03	-41.35	2.86	-2.03
Electricity	-0.05	0.12	0.71	-0.05	0.12	-0.02
<i>T-Statistics</i>	-38.08	2.26	1.31	-38.08	2.26	-1.31
Electronics	-0.05	0.17	1.27**	-0.05	0.17	-0.04**
<i>T-Statistics</i>	-34.69	2.86	2.11	-34.69	2.86	-2.11
Engineering	-0.05	0.14	1.58**	-0.05	0.14	-0.05**
<i>T-Statistics</i>	-37.97	2.52	2.89	-37.97	2.52	-2.89
Equity and Non-Equity Investment	-0.05	0.20	2.65**	-0.05	0.2	-0.08**
<i>T-Statistics</i>	-29.76	2.89	3.91	-29.76	2.89	-3.91
Food & Drug	-0.05	0.14	1.58**	-0.05	0.14	-0.05**
<i>T-Statistics</i>	-37.97	2.52	2.89	-37.97	2.52	-2.89
Food Producers	-0.05	0.16	0.62	-0.05	0.16	-0.02
<i>T-Statistics</i>	-44.74	3.50	1.36	-44.74	3.5	-1.36
Forest	-0.05	0.16	0.91*	-0.05	0.16	-0.03*
<i>T-Statistics</i>	-39.27	2.92	1.74	-39.27	2.92	-1.74
Gas	-0.05	0.14	0.36	-0.05	0.14	-0.01
<i>T-Statistics</i>	-40.68	2.83	0.72	-40.68	2.83	-0.72
Gas & Oil	-0.05	0.14	-0.12	-0.05	0.14	0.00
<i>T-Statistics</i>	-30.87	2.16	-0.17	-30.87	2.16	0.17
General Industrial	-0.05	0.15	1.58**	-0.05	0.15	-0.05**
<i>T-Statistics</i>	-39.69	2.79	3.05	-39.69	2.79	-3.05
General Financial	-0.05	0.19	1.45**	-0.05	0.19	-0.04**
<i>T-Statistics</i>	-32.28	3.02	2.33	-32.28	3.02	-2.33
Health Care	-0.05	0.15	1.31**	-0.05	0.15	-0.04**
<i>T-Statistics</i>	-38.99	2.88	2.50	-38.99	2.88	-2.50
Household Goods	-0.05	0.16	1.48**	-0.05	0.16	-0.04**
<i>T-Statistics</i>	-42.00	3.25	3.05	-42.00	3.25	-3.05
Industry Transportation	-0.05	0.13	0.89*	-0.05	0.13	-0.03*
<i>T-Statistics</i>	-41.43	2.61	1.79	-41.43	2.61	-1.79
Leisure Goods	-0.05	0.15	1.84**	-0.05	0.15	-0.06**
<i>T-Statistics</i>	-35.54	2.55	3.18	-35.54	2.55	-3.18
Life & Non-Life Insurance	-0.05	0.11	2.28**	-0.05	0.11	-0.07**
<i>T-Statistics</i>	-33.43	1.81	3.72	-33.43	1.81	-3.72
Media	-0.05	0.20	1.00	-0.05	0.20	-0.03

<i>T-Statistics</i>	-31.38	3.16	1.57	-31.38	3.16	-1.57
Metal	-0.05	0.19	1.87**	-0.05	0.19	-0.06**
<i>T-Statistics</i>	-37.13	3.40	3.40	-37.13	3.40	-3.40
Personal Goods	-0.05	0.15	1.84**	-0.05	0.15	-0.06**
<i>T-Statistics</i>	-39.39	2.96	3.58	-39.39	2.96	-3.58
Pharmaceuticals	-0.05	0.16	1.73**	-0.05	0.16	-0.05**
<i>T-Statistics</i>	-38.67	2.95	3.26	-38.67	2.95	-3.26
Real Estate	-0.05	0.22	2.32**	-0.05	0.22	-0.07**
<i>T-Statistics</i>	-32.28	3.51	3.74	-32.28	3.51	-3.74
Retailers	-0.05	0.13	1.13**	-0.05	0.13	-0.03**
<i>T-Statistics</i>	-39.43	2.49	2.19	-39.43	2.49	-2.19
Software	-0.05	0.22	2.10**	-0.05	0.22	-0.06**
<i>T-Statistics</i>	-26.58	2.84	2.78	-26.58	2.84	-2.78
Support Service	-0.05	0.10	1.63**	-0.05	0.10	-0.05**
<i>T-Statistics</i>	-38.25	1.90	3.04	-38.25	1.90	-3.04
Technology	-0.05	0.15	2.08**	-0.05	0.15	-0.06**
<i>T-Statistics</i>	-30.32	2.18	3.04	-30.32	2.18	-3.04
Telecommunication	-0.05	0.21	1.63**	-0.05	0.21	-0.05*
<i>T-Statistics</i>	-20.65	2.15	1.69	-20.65	2.15	-1.69
Travel & Leisure	-0.05	0.13	0.89*	-0.05	0.11	-0.02*
<i>T-Statistics</i>	-41.43	2.61	1.79	-42.80	2.28	-1.61
Others	-0.05	0.17	0.79	-0.05	0.17	-0.02
<i>T-Statistics</i>	-29.62	2.42	1.15	-29.62	2.42	-1.15
All	-0.01	-0.02	-0.36	-0.01	-0.00	0.01
<i>T-Statistics</i>	-10.28	-0.30	-0.71	-10.28	-0.30	0.71

\*Significance at 10% level

\*\*Significance at 5% level

**Table 7: The Long-Run Impact of September 11 Attacks on the Systematic Risk of Japanese Industry Indices**

*This table presents the regression analysis results for 34 Japanese industries after the September 11 terrorist attack. The first multiplicative dummy variable equation illustrates the impact on systematic risk and the second additive dummy variable equation shows the impact on the intercept (see equation 14).*

$$\tilde{r}_{it} - \tilde{r}_{ft} = \delta_0 + \delta_1 [\tilde{r}_{mt} - \tilde{r}_{ft}] + \delta_2 [\tilde{r}_{mt} - \tilde{r}_{ft}] * SD + \delta_3 (SD)$$

Industry	$\delta_0$	$\delta_1$	$\delta_2$	$\delta_3$
Aerospace	-0.05	0.03	-0.19	0.03**
<i>T-Statistics</i>	-32.74	0.44	-0.74	5.52
Automobile	-0.05	0.10	0.33*	0.02**
<i>T-Statistics</i>	-42.8	2.01	1.72	5.45
Banks	-0.05	0.07	0.22	0.03**
<i>T-Statistics</i>	-42.31	1.31	1.11	6.67
Beverages	-0.05	0.06	0.32	0.03**
<i>T-Statistics</i>	-41.48	1.06	1.64	6.39
Chemicals	-0.05	0.09	0.38*	0.02**
<i>T-Statistics</i>	-42.24	1.68	1.95	6.05
Construction	-0.05	0.08	0.30	0.02**
<i>T-Statistics</i>	-44.14	1.61	1.64	6.74
Electricity	-0.05	0.08	-0.03	0.02**
<i>T-Statistics</i>	-39.86	1.5	-0.15	5.84
Electronics	-0.05	0.11	0.20	0.03**
<i>T-Statistics</i>	-36.31	1.87	0.89	5.81
Engineering	-0.05	0.07	0.47	0.02**
<i>T-Statistics</i>	-39.63	1.27	2.25**	5.89
Equity and Non-Equity Investment	-0.05	0.10	0.91**	0.03**
<i>T-Statistics</i>	-31.23	1.41	3.49	5.56
Food & Drug	-0.05	0.07	0.47**	0.02**
<i>T-Statistics</i>	-39.63	1.27	2.25	5.89
Food Products	-0.05	0.11	0.13	0.02**
<i>T-Statistics</i>	-47.43	2.51	0.79	6.54
Forest	-0.05	0.10	0.29	0.02**
<i>T-Statistics</i>	-40.73	1.86	1.44	5.51
Gas	-0.05	0.10	0.11	0.02**
<i>T-Statistics</i>	-42.46	1.91	0.59	5.74
Gas & Oil	-0.05	0.08	0.35	0.02**
<i>T-Statistics</i>	-31.6	1.15	1.37	4.38
General Industrial	-0.05	0.08	0.43**	0.02**
<i>T-Statistics</i>	-41.13	1.57	2.21	5.77
General Finance	-0.05	0.12	0.45	0.02**
<i>T-Statistics</i>	-33.29	1.93	1.87	4.99

Health Care	-0.05	0.10	0.20	0.03**
<i>T-Statistics</i>	-41.4	1.83	1.04	6.63
Household Goods	-0.05	0.09	0.52**	0.02**
<i>T-Statistics</i>	-44.37	1.82	2.85	6.45
Industry Transportation	-0.05	0.07	0.40**	0.02**
<i>T-Statistics</i>	-43.71	1.33	2.15	6.15
Leisure Goods	-0.05	0.08	0.59**	0.02**
<i>T-Statistics</i>	-36.5	1.30	2.64	5.10
Life & Non-Life Insurance	-0.05	0.03	0.77**	0.02**
<i>T-Statistics</i>	-34.03	0.51	3.24	4.60
Media	-0.05	0.12	0.54**	0.03**
<i>T-Statistics</i>	-33.14	1.90	2.27	5.57
Metal	-0.05	0.11	0.69**	0.03**
<i>T-Statistics</i>	-39.17	1.90	3.33	6.12
Personal Goods	-0.05	0.08	0.52**	0.02**
<i>T-Statistics</i>	-41.11	1.60	2.69	6.14
Pharmaceuticals	-17.14	-2.10	12.02**	0.58**
<i>T-Statistics</i>	-40.98	-2.16	3.31	8.26
Real Estate	-0.05	0.15	0.60**	0.02**
<i>T-Statistics</i>	-32.58	2.34	2.46	4.51
Retailer	-0.05	0.07	0.30	0.02**
<i>T-Statistics</i>	-41.17	1.38	1.56	5.88
Software	-0.05	0.13	0.64**	0.03**
<i>T-Statistics</i>	-27.41	1.72	2.19	4.62
Support Service	-0.05	0.04	0.39*	0.02**
<i>T-Statistics</i>	-39.01	0.82	1.89	5.14
Technology	-0.05	0.07	0.55**	0.03**
<i>T-Statistics</i>	-31.23	1.06	2.10	5.00
Telecommunication	-0.05	0.11	0.69*	0.03**
<i>T-Statistics</i>	-21.46	1.14	1.87	4.11
Travel & Leisure	-0.05	0.05	0.33*	0.02**
<i>T-Statistics</i>	-44.64	1.10	1.80	5.79
Others	-0.05	0.09	0.52**	0.03**
<i>T-Statistics</i>	-31.01	1.25	2.00	5.10
All	-0.01	-0.05	0.14	0.01**
<i>T-Statistics</i>	-10.78	-0.94	0.71	2.99

\*Significance at 10% level

\*\*Significance at 5% level



**Table 8: The Short-Run Impact of Bali Bombings on the Systematic Risk of Japanese Industries**

*This table presents the regression analysis results for 34 Japanese industries after the Bali bombings (see equation 12 and 13). The first multiplicative dummy variable equation illustrates the impact on systematic risk and the second additive dummy variable equation shows the impact on the intercept.*

Industry	$\tilde{r}_{it} - \tilde{r}_{jt} = \phi + \beta_1^1 [\tilde{r}_{mt} - \tilde{r}_{jt}] + \beta_1^2 [\tilde{r}_{mt} - \tilde{r}_{jt}] * D + \tilde{\epsilon}_{it}$			$\tilde{r}_{it} - \tilde{r}_{jt} = \phi + \alpha_1^1 [\tilde{r}_{mt} - \tilde{r}_{jt}] + \alpha_1^2 D + \tilde{\epsilon}_{it}$		
	$\phi$	$\beta_1^1$	$\beta_1^2$	$\phi$	$\alpha_1^1$	$\alpha_1^2$
Aerospace	-0.01	0.10	2.41	-0.01	0.10	-0.02
<i>T-Statistics</i>	-7.75	1.28	1.54	-7.75	1.28	-1.54
Automobile	-0.01	0.05	1.89**	-0.01	0.05	-0.06**
<i>T-Statistics</i>	-17.94	1.93	6.89	-17.94	1.93	-6.89
Banks	-0.01	0.08	-0.20	-0.01	0.08	0.00
<i>T-Statistics</i>	-11.06	1.49	-0.19	-11.06	1.49	0.19
Beverages	-0.01	-0.01	0.93	-0.01	-0.01	-0.01
<i>T-Statistics</i>	-16.91	-0.13	1.14	-16.91	-0.13	-1.14
Chemicals	-0.01	0.02	0.29	-0.01	0.02	0.00
<i>T-Statistics</i>	-13.69	0.53	0.32	-13.69	0.53	-0.32
Construction	-0.01	0.02	0.63	-0.01	0.02	0.00
<i>T-Statistics</i>	-14.3	0.41	0.73	-14.3	0.41	-0.73
Electricity	-0.01	0.07	0.48	-0.01	0.07	0.00
<i>T-Statistics</i>	-16.63	1.77	0.67	-16.63	1.77	-0.67
Electronics	-0.01	0.08	-0.26	-0.01	0.08	0.00
<i>T-Statistics</i>	-11.75	1.51	-0.25	-11.75	1.51	0.25
Engineering	-0.01	-0.01	0.80	-0.01	-0.01	-0.01
<i>T-Statistics</i>	-12.62	-0.12	0.82	-12.62	-0.12	-0.82
Equity and Non-Equity Investment	-0.01	0.07	0.31	-0.01	0.07	0.00
<i>T-Statistics</i>	-12.48	1.38	0.32	-12.48	1.38	-0.32
Food & Drug	-0.01	0.01	0.29	-0.01	0.01	0.00

<i>T-Statistics</i>	-22.23	0.44	0.48	-22.23	0.44	-0.48
Food Producers	-0.01	0.02	-0.01	-0.01	0.02	0.00
<i>T-Statistics</i>	-20.23	0.70	-0.02	-20.23	0.70	0.02
Forest	-0.01	0.02	0.59	-0.01	0.02	0.00
<i>T-Statistics</i>	-15.23	0.43	0.69	-15.23	0.43	-0.69
Gas	-0.01	0.11	1.39	-0.01	0.11	-0.01
<i>T-Statistics</i>	-7.96	1.45	0.93	-7.96	1.45	-0.93
Gas & Oil	-0.01	0.05	0.14	-0.01	0.05	0.00
<i>T-Statistics</i>	-18.26	1.59	0.20	-18.26	1.59	-0.20
General Industrial	-0.01	0.03	0.07	-0.01	0.03	0.00
<i>T-Statistics</i>	-10.36	0.52	0.06	-10.36	0.52	-0.06
General Financial	-0.01	0.01	-0.42	-0.01	0.01	0.00
<i>T-Statistics</i>	-12.67	0.19	-0.42	-12.67	0.19	0.42
Health Care	-0.01	0.00	-0.25	-0.01	0.00	0.00
<i>T-Statistics</i>	-12.74	0.09	-0.25	-12.74	0.09	0.25
Household Goods	-0.01	0.01	0.41	-0.01	0.01	0.00
<i>T-Statistics</i>	-15.96	0.33	0.52	-15.96	0.33	-0.52
Industry Transportation	-0.01	0.00	0.49	-0.01	0.00	0.00
<i>T-Statistics</i>	-13.91	-0.05	0.51	-13.91	-0.05	-0.51
Leisure Goods	-0.01	0.04	0.83	-0.01	0.04	-0.01
<i>T-Statistics</i>	-11.13	0.76	0.76	-11.13	0.76	-0.76
Life & Non-Life Insurance	-0.01	0.09	0.54	-0.01	0.09	0.00
<i>T-Statistics</i>	-7.37	0.94	0.29	-7.37	0.94	-0.29
Media	-0.01	0.02	0.79	-0.01	0.02	-0.01
<i>T-Statistics</i>	-9.39	0.24	0.60	-9.39	0.24	-0.60
Metal	-0.01	0.05	0.43	-0.01	0.05	0.00
<i>T-Statistics</i>	-8.29	0.66	0.29	-8.29	0.66	-0.29
Personal Goods	-0.01	0.01	0.87	-0.01	0.01	-0.01
<i>T-Statistics</i>	-13.69	0.24	0.90	-13.69	0.24	-0.90
Pharmaceuticals	-0.01	0.01	0.18	-0.01	0.01	0.00
<i>T-Statistics</i>	-13.39	0.18	0.19	-13.39	0.18	-0.19

Real Estate	-0.01	0.02	0.08	-0.01	0.02	0.00
<i>T-Statistics</i>	-10.01	0.26	0.06	-10.01	0.26	-0.06
Retailers	-0.01	-0.03	0.18	-0.01	-0.03	0.00
<i>T-Statistics</i>	-14.09	-0.58	0.19	-14.09	-0.58	-0.19
Software	-0.01	0.00	1.90	-0.01	0.00	-0.01
<i>T-Statistics</i>	-8.01	0.03	1.17	-8.01	0.03	-1.17
Support Service	-0.01	0.04	0.99	-0.01	0.04	-0.01
<i>T-Statistics</i>	-9.72	0.58	0.77	-9.72	0.58	-0.77
Technology	-0.01	0.03	0.31	-0.01	0.03	0.00
<i>T-Statistics</i>	-10.81	0.44	0.26	-10.81	0.44	-0.26
Telecommunication	-0.01	0.03	1.19	-0.01	0.03	-0.01
<i>T-Statistics</i>	-5.16	0.27	0.51	-5.16	0.27	-0.51
Travel & Leisure	-0.01	-0.02	0.19	-0.01	-0.02	0.00
<i>T-Statistics</i>	-16.45	-0.40	0.23	-16.45	-0.40	-0.23
Others	-0.01	0.13	0.06	-0.01	0.13	0.00
<i>T-Statistics</i>	-5.26	1.11	0.03	-5.26	1.11	-0.03
All	0.00	0.34	0.60	0.00	0.34	0.00
<i>T-Statistics</i>	-1.02	1.48	0.13	-1.02	1.48	-0.13

---

\*Significance at 10% level

\*\*Significance at 5% level

**Table 9: The Long-Run Impact of Bali Bombings on the Systematic Risk of Japanese Industry Indices**

*This table presents the regression analysis results for 34 Japanese industries after the Bali bombings. The first multiplicative dummy variable equation illustrates the impact on systematic risk and the second additive dummy variable equation shows the impact on the intercept (see equation 14).*

$$\tilde{r}_{it} - \tilde{r}_{ft} = \delta_0 + \delta_l^1 [\tilde{r}_{mt} - \tilde{r}_{ft}] + \delta_l^2 [\tilde{r}_{mt} - \tilde{r}_{ft}] * SD + \delta_l^3 (SD)$$

Industry	$\delta_0$	$\delta_l^1$	$\delta_l^2$	$\delta_l^3$
Aerospace	-0.01	-0.02	0.15**	0.00
<i>T-Statistics</i>	-5.61	-0.35	2.06	0.01
Automobile	0.00	-0.02	0.13**	0.00
<i>T-Statistics</i>	-2.31	-0.61	2.21	-1.61
Banks	0.00	-0.03	0.13**	0.00
<i>T-Statistics</i>	-6.21	-0.61	2.52	-1.58
Beverages	-0.01	-0.01	0.13**	0.00
<i>T-Statistics</i>	-9.82	-0.43	3.65	-1.28
Chemicals	0.00	0.00	0.13**	0.00
<i>T-Statistics</i>	-7.73	-0.10	3.03	-1.69
Construction	0.00	0.00	0.14	0.00
<i>T-Statistics</i>	0.00	0.91	0.00	0.05
Electricity	-0.01	0.01	0.09**	0.00
<i>T-Statistics</i>	-10.54	0.21	2.59	-0.92
Electronics	0.00	0.00	0.14**	0.00
<i>T-Statistics</i>	-6.14	0.11	2.70	-1.43
Engineering	-0.01	-0.02	0.13**	0.00
<i>T-Statistics</i>	-7.04	-0.47	2.76	-1.20
E&N Investment <sup>1</sup>	-0.01	0.00	0.11**	0.00
<i>T-Statistics</i>	-8.86	0.08	2.06	1.28
Food & Drug	0.00	0.00	0.11**	0.00
<i>T-Statistics</i>	-10.42	0.17	3.63	-1.02
Food Products	0.00	-0.01	0.12**	0.00
<i>T-Statistics</i>	-11.25	-0.51	4.17	-1.50
Forest	-0.01	-0.04	0.14**	0.00
<i>T-Statistics</i>	-8.68	-1.13	3.53	-1.62
Gas	-0.01	-0.01	0.13**	0.00
<i>T-Statistics</i>	-10.31	-0.48	3.97	-1.34
Gas & Oil	-0.01	-0.01	0.13**	0.00
<i>T-Statistics</i>	-6.21	-0.21	2.29	-0.74
General Industrial	-0.01	-0.02	0.14**	0.00
<i>T-Statistics</i>	-7.81	-0.48	3.02	-0.87
General Finance	-0.01	-0.03	0.17**	0.00
<i>T-Statistics</i>	-5.51	-0.55	2.40	-0.14
Health Care	-0.01	-0.03	0.14**	0.00
<i>T-Statistics</i>	-8.40	-0.70	3.30	-0.97
Household Goods	0.00	-0.01	0.14**	0.00
<i>T-Statistics</i>	-8.31	-0.40	3.51	-1.23
Industry Transportation	-0.01	-0.02	0.12**	0.00
<i>T-Statistics</i>	-8.99	-0.58	3.13	-1.54
Leisure Goods	-0.01	-0.02	0.14**	0.00
<i>T-Statistics</i>	-6.51	-0.37	2.58	-0.99
Life & Non-Life Insurance	0.00	-0.04	0.16**	0.00
<i>T-Statistics</i>	-3.97	-0.63	2.01	-1.20

Media	-0.01	-0.01	0.13**	0.00
<i>T-Statistics</i>	-6.57	-0.10	2.20	0.11
Metal	-0.01	-0.03	0.16**	0.00
<i>T-Statistics</i>	-5.42	-0.48	2.49	-0.73
Personal Goods	-0.01	-0.01	0.14**	0.00
<i>T-Statistics</i>	-7.89	-0.30	2.97	-0.85
Pharmaceuticals	-0.01	-0.02	0.12**	0.00
<i>T-Statistics</i>	-8.31	-0.43	3.00	-1.47
Real Estate	-0.01	0.00	0.1**	0.00
<i>T-Statistics</i>	-6.12	0.02	1.58	-0.39
Retailer	0.00	0.00	0.11**	0.00
<i>T-Statistics</i>	-7.33	0.09	2.45	-1.12
Software	-0.01	0.01	0.11**	0.00
<i>T-Statistics</i>	-5.74	0.23	1.50	0.38
Support Service	-0.01	0.00	0.12**	0.00
<i>T-Statistics</i>	-6.59	0.02	2.16	-0.45
Technology	0.00	-0.01	0.15**	0.00
<i>T-Statistics</i>	-5.54	-0.18	2.47	-1.04
Telecommunication	-0.01	-0.01	0.17*	0.00
<i>T-Statistics</i>	-3.71	-0.14	1.85	-0.53
Travel & Leisure	-0.01	0.01	0.11**	0.00
<i>T-Statistics</i>	-8.80	0.23	2.73	-1.61
Others	-0.01	0.02	0.13	0.00
<i>T-Statistics</i>	-4.75	0.32	1.42	0.44
All	-0.01	-0.02	0.15**	0.00
<i>T-Statistics</i>	-5.61	-0.35	2.06	0.01

---

\*Significance at 10% level

\*\*Significance at 5% level

**Table 10: The Short-Run Impact of Madrid Bombings on the Systematic Risk of Japanese Industries**

*This table presents the regression analysis results for 34 Japanese industries after the Madrid bombings (see equation 12 and 13). The first multiplicative dummy variable equation illustrates the impact on systematic risk and the second additive dummy variable equation shows the impact on the intercept.*

Industry	$\tilde{r}_{it} - \tilde{r}_{jt} = \phi_I + \beta_I^1 [\tilde{r}_{mt} - \tilde{r}_{jt}] + \beta_I^2 [\tilde{r}_{mt} - \tilde{r}_{jt}] * D + \tilde{\epsilon}_{it}$			$\tilde{r}_{it} - \tilde{r}_{jt} = \varphi_I + \alpha_I^1 [\tilde{r}_{mt} - \tilde{r}_{jt}] + \alpha_I^2 D + \tilde{\epsilon}_{it}$		
	$\phi$	$\beta_I^1$	$\beta_I^2$	$\varphi$	$\alpha_I^1$	$\alpha_I^2$
Aerospace	0.00	0.02	-0.17	0.00	0.02	0.00
<i>T-Statistics</i>	-1.47	0.35	-0.26	-1.47	0.35	0.26
Automobile	0.00	0.03	0.12	0.00	0.03	0.00
<i>T-Statistics</i>	-4.31	0.93	0.36	-4.31	0.93	-0.36
Banks	0.00	-0.01	0.79**	0.00	-0.01	-0.02**
<i>T-Statistics</i>	-3.92	-0.15	1.99	-3.92	-0.15	-1.99
Beverages	0.00	0.02	0.23	0.00	0.02	-0.01
<i>T-Statistics</i>	-4.69	0.60	0.88	-4.69	0.60	-0.88
Chemicals	0.00	0.01	0.20	0.00	0.01	0.00
<i>T-Statistics</i>	-3.73	0.41	0.59	-3.73	0.41	-0.59
Construction	0.00	0.03	0.07	0.00	0.03	0.00
<i>T-Statistics</i>	-2.81	1.03	0.21	-2.81	1.03	-0.21
Electricity	0.00	-0.03	0.26	0.00	-0.03	-0.01
<i>T-Statistics</i>	-7.49	-1.37	1.03	-7.49	-1.37	-1.03
Electronics	0.00	0.04	0.17	0.00	0.04	0.00
<i>T-Statistics</i>	-1.57	0.94	0.36	-1.57	0.94	-0.36
Engineering	0.00	0.00	0.14	0.00	0.00	0.00
<i>T-Statistics</i>	-2.20	0.08	0.36	-2.20	0.08	-0.36
Equity & Non-Equity Investment	0.00	-0.01	0.60	0.00	-0.01	-0.01
<i>T-Statistics</i>	-1.41	-0.11	1.10	-1.41	-0.11	-1.10
Food & Drug	0.00	0.02	0.14	0.00	0.02	0.00

<i>T-Statistics</i>	-6.97	0.89	0.75	-6.97	0.89	-0.75
Food Producers	0.00	-0.01	-0.03	0.00	-0.01	0.00
<i>T-Statistics</i>	-6.63	-0.73	-0.12	-6.63	-0.73	0.12
Forest	0.00	-0.01	0.41	0.00	-0.01	-0.01
<i>T-Statistics</i>	-4.16	-0.27	1.31	-4.16	-0.27	-1.31
Gas	0.00	-0.02	0.35	0.00	-0.02	-0.01
<i>T-Statistics</i>	-6.98	-0.71	1.53	-6.98	-0.71	-1.53
Gas & Oil	0.00	-0.06	0.65	0.00	-0.06	-0.01
<i>T-Statistics</i>	-2.98	-1.26	1.37	-2.98	-1.26	-1.37
General Industrial	0.00	-0.02	0.28	0.00	-0.02	-0.01
<i>T-Statistics</i>	-2.79	-0.50	0.74	-2.79	-0.50	-0.74
General Financial	0.00	0.01	0.67	0.00	0.01	-0.01
<i>T-Statistics</i>	-0.02	0.18	0.98	-0.02	0.18	-0.98
Health Care	0.00	-0.03	-0.23	0.00	-0.03	0.01
<i>T-Statistics</i>	-3.04	-0.79	-0.68	-3.04	-0.79	0.68
Household Goods	0.00	0.02	-0.07	0.00	0.02	0.00
<i>T-Statistics</i>	-2.73	0.86	-0.24	-2.73	0.86	0.24
Industry Transportation	0.00	-0.02	0.46	0.00	-0.02	-0.01
<i>T-Statistics</i>	-3.49	-0.60	1.48	-3.49	-0.60	-1.48
Leisure Goods	0.00	0.02	0.29	0.00	0.02	-0.01
<i>T-Statistics</i>	-2.10	0.37	0.62	-2.10	0.37	-0.62
Life & Non-Life Insurance	0.00	-0.09	1.43*	0.00	-0.09	-0.03*
<i>T-Statistics</i>	-0.74	-1.13	1.78	-0.74	-1.13	-1.78
Media	0.00	0.04	0.05	0.00	0.04	0.00
<i>T-Statistics</i>	-0.65	0.71	0.08	-0.65	0.71	-0.08
Metal	0.00	0.01	0.44	0.00	0.01	-0.01
<i>T-Statistics</i>	-1.41	0.14	0.74	-1.41	0.14	-0.74
Personal Goods	0.00	0.02	0.15	0.00	0.02	0.00
<i>T-Statistics</i>	-2.73	0.55	0.39	-2.73	0.55	-0.39
Pharmaceuticals	0.00	0.00	0.33	0.00	0.00	-0.01
<i>T-Statistics</i>	-4.82	-0.01	1.05	-4.82	-0.01	-1.05

Real Estate	0.00	0.02	-0.33	0.00	0.02	0.01
<i>T-Statistics</i>	-0.56	0.41	-0.62	-0.56	0.41	0.62
Retailers	0.00	0.02	0.15	0.00	0.02	0.00
<i>T-Statistics</i>	-3.04	0.64	0.51	-3.04	0.64	-0.51
Software	0.00	-0.01	0.16	0.00	-0.01	0.00
<i>T-Statistics</i>	0.04	-0.12	0.23	0.04	-0.12	-0.23
Support Service	0.00	0.02	0.37	0.00	0.02	-0.01
<i>T-Statistics</i>	-1.00	0.53	0.88	-1.00	0.53	-0.88
Technology	0.00	0.03	0.51	0.00	0.03	-0.01
<i>T-Statistics</i>	-1.44	0.51	0.89	-1.44	0.51	-0.89
Telecommunication	0.00	0.14	0.48	0.00	0.14	-0.01
<i>T-Statistics</i>	-0.55	1.44	0.46	-0.55	1.44	-0.46
Travel & Leisure	0.00	0.01	0.10	0.00	0.01	0.00
<i>T-Statistics</i>	-3.76	0.28	0.39	-3.76	0.28	-0.39
Others	0.00	0.01	0.99	0.00	0.01	-0.02
<i>T-Statistics</i>	-0.84	0.10	0.96	-0.84	0.10	-0.96
All	0.00	-0.07	0.73	0.00	-0.07	-0.02
<i>T-Statistics</i>	-0.51	-0.31	0.30	-0.51	-0.31	-0.30

---

\*Significance at 10% level

\*\*Significance at 5% level



**Table 11: The Long-Run Impact of Madrid Bombings on the Systematic Risk of Japanese Industry Indices**

*This table presents the regression analysis results for 34 Japanese industries after the Madrid bombings. The first multiplicative dummy variable equation illustrates the impact on systematic risk and the second additive dummy variable equation shows the impact on the intercept (see equation 14).*

$$\tilde{r}_i - \tilde{r}_{ft} = \delta_0 + \delta_I^1 [\tilde{r}_{mt} - \tilde{r}_{ft}] + \delta_I^2 [\tilde{r}_{mt} - \tilde{r}_{ft}] * SD + \delta_I^3 (SD)$$

Industry	$\delta_0$	$\delta_I^1$	$\delta_I^2$	$\delta_I^3$
Aerospace	0.00	0.02	0.08	-0.01**
<i>T-Statistics</i>	-1.58	0.27	1.05	-6.20
Automobile	0.00	0.03	0.05	-0.01**
<i>T-Statistics</i>	-3.62	0.81	1.03	-9.41
Banks	0.00	0.00	0.08	-0.01**
<i>T-Statistics</i>	-3.12	-0.03	1.26	-6.95
Beverages	0.00	0.01	0.07*	-0.01**
<i>T-Statistics</i>	-4.02	0.43	1.88	-11.63
Chemicals	0.00	0.01	0.09*	-0.01**
<i>T-Statistics</i>	-3.30	0.31	1.78	-9.09
Construction	0.00	0.02	0.09*	-0.01**
<i>T-Statistics</i>	-2.65	0.43	1.95	-9.92
Electricity	0.00	-0.04	0.11**	-0.01**
<i>T-Statistics</i>	-5.20	-1.00	2.70	-9.01
Electronics	0.00	0.04	0.07	-0.01**
<i>T-Statistics</i>	-1.68	0.88	1.10	-8.36
Engineering	0.00	0.00	0.08	-0.01**
<i>T-Statistics</i>	-2.07	0.05	1.38	-8.61
E&N Investment	0.00	0.00	0.1*	-0.01**
<i>T-Statistics</i>	-1.63	-0.03	1.68	-8.89
Food & Drug	0.00	0.01	0.08**	-0.01**
<i>T-Statistics</i>	-4.61	0.36	2.24	-12.58
Food Products	0.00	-0.01	0.11**	-0.01**
<i>T-Statistics</i>	-4.85	-0.54	3.27	-13.37
Forest	0.00	0.00	0.07	-0.01**
<i>T-Statistics</i>	-3.73	-0.02	1.55	-10.59
Gas	0.00	-0.02	0.13**	-0.01**
<i>T-Statistics</i>	-5.69	-0.71	3.54	-10.57
Gas & Oil	0.00	-0.06	0.2**	-0.01**
<i>T-Statistics</i>	-2.75	-1.16	2.96	-6.21
General Industrial	0.00	-0.02	0.12**	-0.01**
<i>T-Statistics</i>	-2.62	-0.47	2.29	-9.20
General Finance	0.00	0.00	0.08	-0.01**
<i>T-Statistics</i>	-0.21	0.01	0.98	-7.14
Health Care	0.00	-0.02	0.11**	-0.01**
<i>T-Statistics</i>	-2.88	-0.50	2.15	-9.02
Household Goods	0.00	0.01	0.09*	-0.01**
<i>T-Statistics</i>	-2.51	0.38	1.83	-10.35
Industry Transportation	0.00	-0.03	0.12**	-0.01**
<i>T-Statistics</i>	-3.15	-0.86	2.58	-10.49
Leisure Goods	0.00	0.02	0.07	-0.01**
<i>T-Statistics</i>	-2.04	0.43	1.19	-7.85
Life & Non-Life Insurance	0.00	-0.08	0.20	-0.01**
<i>T-Statistics</i>	-0.94	-1.07	2.14**	-5.40

Media	0.00	0.04	0.03	-0.01**
<i>T-Statistics</i>	-0.77	0.72	0.35	-7.43
Metal	0.00	0.01	0.09	-0.01**
<i>T-Statistics</i>	-1.65	0.19	1.20	-6.38
Personal Goods	0.00	0.02	0.08	-0.01**
<i>T-Statistics</i>	-2.69	0.36	1.42	-8.88
Pharmaceuticals	0.00	-0.01	0.1**	-0.01**
<i>T-Statistics</i>	-3.89	-0.18	2.06	-9.13
Real Estate	0.00	0.01	0.03	-0.01**
<i>T-Statistics</i>	-0.61	0.14	0.35	-7.73
Retailer	0.00	0.00	0.08	-0.01**
<i>T-Statistics</i>	-2.42	0.06	1.43	-9.38
Software	0.00	-0.01	0.08	-0.01**
<i>T-Statistics</i>	-0.36	-0.13	0.89	-6.33
Support Service	0.00	0.02	0.06	-0.01**
<i>T-Statistics</i>	-1.04	0.34	0.90	-7.55
Technology	0.00	0.03	0.06	-0.01**
<i>T-Statistics</i>	-1.54	0.58	0.81	-7.37
Telecommunication	0.00	0.15	-0.07	-0.01**
<i>T-Statistics</i>	-0.65	1.63	-0.64	-5.17
Travel & Leisure	0.00	0.00	0.08*	-0.01**
<i>T-Statistics</i>	-2.85	-0.01	1.83	-10.59
Others	0.00	0.02	0.07	-0.01**
<i>T-Statistics</i>	-1.26	0.21	0.68	-4.53
All	0.00	-0.05	0.30	-0.01*
<i>T-Statistics</i>	-0.74	-0.26	1.40	-1.66

---

\*Significance at 10% level

\*\*Significance at 5% level

**Figure 1: AR and CAR5 on Japanese Industry Indices Following September 11**

