The Response of the Pakistani Stock market to a Cataclysmic Event

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This study has examined the reaction of Pakistani stock market to earthquake of October 8, 2005 and its impact on the price, volume and volatility behavior of sixty firms listed on Karachi Stock Exchange (KSE) The event study methodology is adopted to assess the KSE response to this unforeseen disaster and result shows that it quickly rebounded. The market displayed amazing resilience by being effected less severely than it was expected by bouncing back following its initial level because the market was already in recession after mi-March 2005 decline. As regards the firm level activities, the analysis indicates that the increase in the return and volume of cement, steel, food, chemicals and pharmaceuticals and banking stocks indicates that individual has expectation for the upcoming demand of investment in these sectors. Furthermore there is no significant increase in the volatility because the investors take lessons from the crash of March 2005 and seem certain about the future outlook**.** These findings support the hypothesis that Pakistani market is reactive to unanticipated shocks however, it is resilient and it recovers soon from the catastrophic shock.

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Key Words: event study, Kashmir earthquake, risk, return, volume, GARCH-M model.

I Introduction

The earthquake that struck northern areas and Azad Kashmir in the morning of October 8, 2005 is the most severe earthquake ever struck to this region. A large body of empirical literature suggests that stock prices are highly and instantaneously reactive to such unanticipated disastrous occurring. The stock prices reflect investors' expectations about the future returns, and taken as aggregate stock price movement can generate a wave of activity. The unanticipated disastrous events can have serious implications for stocks and bonds because of their liquidity. The decisions made by investors to buy and sell can quickly, easily and inexpensively reversed. When information becomes available about a catastrophic event, investors often do not invest in the market in search of safe financial instruments and panic is created. This initial panic has potential to turn into chaos and a long term bear market, or it can be reversed if investors' believes to earn returns.

The information of major events takes no time to impact the stock prices. The importance of particular events and their effect on the stock market has been a subject of study in financial economics literature since long. Such studies attempt to assess the extent to which stock markets' performance stray's from the normal around the time of the occurrence of the events The most successful application of event studies has been in the area of corporate finance. Some examples include the mergers and acquisitions (Jensen and Ruback, 1983); earning announcement (Barklay and Litzenberger, 1988), issue of new debt or equity (Myers and

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Mujluf, 1984) and announcements of macroeconomic variables such as trade deficit (McQueen and Roley, 1993). The event studies are also used in law and economics to measure the impact on the value of the firm due to the change in the regularity environment (Schwert, 1981) and to assess damages in legal liability cases (Mitchell and Netter, 1994). The stock market crash in the USA of October 1987 and related crash in the Far East later in January 1998 have led to several studies of these events (Jong, Kemmna and Klock 1992 and Claessens, Djankov, Fan and Lang,2000). These studies emphasize the need for research to explore what fundamental economic factors trigger the large decline and the institutional and structural factors that are inherent in the trading strategies of investors. Some studies have also investigated the effect of natural disaster on the insurance firms listed on the stock exchanges. Natural disasters have two opposite effects on insurance firm value: a negative effect due to payment of policyholders' claim and a positive effect due to expectations of higher premium. The presence and relative strength of these two effects on insurance firms for Hurricane Andrew is studied by Angbazo and Narayanan (1996) and for Oct 17, 1989 California earthquake by Shelor, Anderson and Cross (1992)

The volatility caused by an unexpected event has been largely observed in almost all of the stock exchanges in the world. That is, the volatility caused by an event has a much longer life than the event itself. This behavior has been consistently observed in a large number of studies including a few for Pakistan (Chou, 1988 and Javid and Ahmed, 1999). It is therefore not surprising that the analysis impact of events on stock market in Pakistan has taken an important position in economic research. The objective of present study is to analyze the response of KSE to October 8, 2005 earthquake and impact on the stock market behavior in Pakistan. In the standard event study methodology, it is tested to determine whether KSE experienced significant abnormal returns in response to this shock. Then the effect on the stock market average return, volatility and volume around the event on the listed firms of Karachi stock exchange is analyzed.

The study is organized as follows. The section two briefly reviews the market for the period under study. The review of the previous empirical findings is presented in section three. The data and methodology is presented in section four. The section five provides the empirical findings and last section offers conclusion of the study.

2 Overview of the Market

It is interesting to present a brief overview of the market for the sample period Jan 2005 to Dec 2006 and Table 1 reports some of the leading indicators of Karachi Stock Exchange (KSE) during the period under study. The KSE came into existence on September 18, 1948. Though two other stock exchanges were latter established in the country, in Lahore and Islamabad in 1970 and 1992 respectively, the KSE remains the main centre of activity where 75 to 80 per cent of current trading takes place. It gained momentum in 1960 and made significant progress in listings and capitalization. However, it lost momentum in 1970 due to political unrest and then nationalization polices adopted by the government. The policy of greater reliance on private enterprise restored the market sentiment in 1980s. The market, however actually regained its momentum in early 1990 when it was opened to international investors. This put a new life in the market giving rise to an unprecedented bullish trend. The size and depth of the market was also improved. In terms of its performance the market has been ranked third among emerging markets. Unfortunately the market could not maintain its performance in latter years because of political and economic instability.

The KSE depicted handsome improvement when the new government assumed office in February 1997. Due to some extraneous factors, where the government has no control, like sharp fall in far Eastern capital markets and heavy drop in the value of these currencies, the international fund manager started to off load their holdings in the region. The shock wave emitted by the market badly affected our stock market as well. During 2000 to 2001, Security and Exchange Commission of Pakistan (SECP) implemented various laws and orders to improve the performance of the stock exchanges and to bring their operations in line with the best international practices. The Code of Corporate Governance was introduced in 2002 and SECP continued to improve the regulatory framework of capital markets during 2003. In addition to the earlier reforms in the areas of rationalization of trading practices, risk management and enhancement of corporate governance, some other reforms are the Carry-Over Trade (COT) system is rationalized. With respect to the performance of the equity markets, the extended rally at the KSE which started in 2003, accelerated in 2005. This is particularly true especially from December 2004 to mid-March 2005, when the KSE index shows an unprecedented sharp growth and touched a record high level of 10,303 points. However, only a part of this improvement can be supported by the improvement in economic fundamentals. The factors like withdrawal of funds by COT financiers, the lock-in effects of circuit breakers, excessive buying in the ready market and selling in the futures market by certain operators have contributed significantly to the mid-March 2005 market decline. The

stock market turned bearish since March 16, 2005 and the KSE 100 index dropped to as low as 6939 as on April 12, 2005 from its peak of 10,303 on 15th March 2005 showing a decline of 32.7 percent. Such a sharp rise in index and a subsequent steep decline represented abnormal and unhealthy movements in the equity market. Notwithstanding sharp fall there were no broker defaults in the stock market and also market was not closed or suspended, as had been the case in some previous market falls.

Since June 2005 KSE 100 index have shown constant rise and the shares value at KSE was steadily increasing inclining towards pre-March level. The first week of October, which had a tragic ending due to quake saw previous records broken in terms of price rise and index level. Over the week the index had risen well over 300 points despite the fact that there is no change in the market fundamentals. Moreover most leading shares virtually reached the saturation point and could not go beyond until pass through a technical correction. The KSE 100 index crossed 8500 points by steadily well above 8542.38 points up by 3.5 percent on October 7, 2005. The market capital rose by Rs 84 billion reached at Rs 2445 billion

Table 1: Leading Indicators on Karachi Stock Market

Months	2005			2006		
	KSE Index (end month)	Market Capitalization (Rs. Billion) (end month)	Turnover of Shares (billion)	KSE Index (end month)	Market Capitalization (Rs. Billion) (end month)	Turnover of Share (billion)
January	6747.4	1840.5	12.2	10524.2	2990.3	8.5
February	8260.1	2262.7	14.0	11456.3	3221.2	10.3
March	7770.3	2114.8	11.2	11485.9	3218.5	8.1
April	7104.7	2022.9	4.9	11342.2	3160.1	6.0
May	6857.7	1792.8	6.1	9800.7	2743.4	5.1
June	7450.1	2013.2	5.6	9989.4	2801.0	4.0
July	7179.0	2013.7	3.1	10497.6	2905.1	4.4
August	7796.9	2132.5	5.0	10064.1	2786.9	4.0
September	8225.6	2329.7	7.9	10512.5	2874.7	3.0
October	8247.3	2340.8	6.5	11327.7	3074.3	3.2
November	90.25.9	2551.2	7.5	10618.8	2919.7	3.8
December	9556.6	2709.5	7.4	10040.5	2738.4	2.6

Source: Karachi Stock Exchange

The KSE 100 continued to gain grounds despite of earthquake due to higher activity in reconstruction of quake devastated areas began. A good bit of speculative activity did not allow the bulls to leave the grip on the price line. The market witnessed a virtual squeeze in bank, oil, auto, cement and pharmaceutical shares followed by fresh price flare-up owing to pressure on floating stocks. The post quake trading period was marked by fresh buying orders

in bank, oil and cement sector. The price rise on the blue chip continued bullish but low daily volume reflected that investors generally played safe as the crash of the last March remained a guiding force for them. Both the KSE 100 index and market capital steadily rose to their pre-reaction levels and were quoted at 8863.87 points up 4.5 percent and at Rs 252.832 billion up by Rs 1214 billion from week after the quake.

After absorbing the shock of massive deaths in the quake stocks were back in the rally as investors covered their position in the cement sector followed by higher sales as result of the reconstruction work in the devastated area started. The support mostly originated from the speculative forces who continued to build upward position in cement, bank and oil sector- not a genuine investor but for instant gain. Some other sectors including textile and steel and those which were directly associated with construction work also remained in active demand with high prices. This bull-run continued and the KSE-100 Index crossed the barrier of 12000 points for the first time in the history of capital market and touched 12274 points on April 17, 2006 showing a growth of 64.7 percent over June 2005. The rally that started towards the end of 2005 was primarily driven by the phenomenal rise in the banking sector and cement sector. The primary reason for such high price of stocks in KSE has been the privatization play and interest of some globally reputable organizations in acquiring strategic stake in these companies. The KSE index was 10058 on December 28, 2006 with market capitalization of 2738.0 billion rupees.

3 Review of Literature

An extensive work in financial economics literature has been done to examine the effect of an event on the stock returns. That event may be in terms of any shock, any policy announced like dividend policy or any natural event like any mishap or disaster. The motivation of undertaking such a study is that, given rationality in the market place, the effect of an event is reflected immediately in the security prices. Two noteworthy papers in this area are Brown and Warner (1980, 1985) which have considered the methodological issues regarding event studies based on daily and monthly data respectively. In theoretical analysis of assessing the impact of an economic event on the return generating process of a firm, Damodaran (1985) has pointed out that its parameters are determined by two elements-the nature of the event structure and information structure. McWilliams and Seigel (1997) have documented that impact of an event can be truly identified if markets are efficient, events are unanticipated and there are no confounding effects during the event window.

The most successful application of event studies has been in the area of corporate finance. Important examples include wealth effect of merger and acquisition and price effect of financing decisions by firms. Jensen and Ruback (1983) and Jarrell, brickley and Netter (1988) provide survey on event study work in the area of merger and acquisition. Jarrell and Poulsen (1988) have documented that average abnormal return for target share holders exceeds 20 percent for a sample of 663 successful takeovers from 1960 to 1985. In contrast the abnormal return for the acquirer is close to zero. As regards the corporation financial decisions, when a corporation announces that it will raise capital from the external market, there is on average a negative abnormal return and the magnitude of it depends on source of external financing. Asquith and Mullins (1986) find for a sample of 266 firms announcing an equity issue in the period 1963 to 1981, the two day average abnormal return is -2.7 percent. Wooldridge and Snow (1990) examine the stock market reaction to public announcements of corporate strategic investment: formation of joint ventures, research and development projects, major capital expenditure and diversification into two products etc. and confirm the shareholder value maximization hypothesis. The implication of a positive reaction by the stock market to the investment announcements is drawn from corporate strategy research and management practices. The less successful application is in areas where event date is difficult to identify or event date is partially anticipated, for example the wealth effect of regulatory changes (Schipper and Thompson, 1985)

The effect of unanticipated natural disaster on the value of listed firms has been studied in the empirical literature on event studies. Angbozo and Narayanan (1996) have examined the impact of Hurricane Andrew on the stock prices of publicly listed US property-liability insurers and find that a large negative effect on insurance stocks that is offset to some extent by the market's expectations of the premium increase. Shelor *et al.* (1992) have investigated the insurance companies after the October 17, 1989 California earthquake resulted in a positive stock price response for property liability and multiple line insurers. Investors' expectations of higher demand for insurance apparently more than offset the potential earthquake losses. The study by Schnusenberg (2000) find German firms exhibit a positive abnormal return of 2.69 percent in the week immediately following the event of unification on November 9, 1989 and negative abnormal return of 0.67 percent in the year following the event indicating an initial over-estimation in their ability to profit from the newly arising opportunities. The American companies operating in Germany showing negative abnormal

return of 0.52 percent attributable to a potential competitive advantage of American verses German firms resulting from information asymmetries. Cummins and Lewis (2003) find that insurance stock prices generally decline following the World Trade Center attack of September 11, 2001, however, the stock price insurers with strong financial rating rebounded after the first post event week. However, Carter and Simkins (2004) finding support the hypothesis of rational pricing and suggest that the market differentiated among various air transportation firms.

There is no serious work done in this area in Pakistan. Javid and Ahmed (1999) analyze the response of Karachi Stock Exchange, to nuclear detonation. The results show that the nuclear detonation by India has significant adverse effects on the daily rate of return at the KSE, while trading volume and the level of volatility increased. The events of nuclear detonation by Pakistan, on the other hand, do not have any significant effect on the average rate of return. However it resulted in an increase in volatility and trade volume. The present study tries to contribute to the existing literature on the event study.

4 Methodological framework and Data

The importance of particular events and their effect on the stock market can be instantaneously captured by stock market prices, volatility and volume. The catastrophic events usually have negative effect on the capital market because of the uncertainty about the future and about the individual firm's abilities and the resources needed to see them through a crisis often clouds judgment, sending many investors into a panic. However, some firms react more negatively (positively) than others.

The event study methodology is based on the efficient market hypothesis (Fama, Jensen and Roll, 1969). This hypothesis states that as new information becomes available as the result of some unexpected event, it is fully taken into account by investors assessing its present and future impact. The investors immediately reassess individual firms and their ability to withstand potential economic, environmental, political, social and demographic changes resulting from an event. The new assessment results in stock price changes that reflect the discounted value of the current and future firm performance. The significant negative and positive price changes can then be attributed to specific event because it is based on the overall assessment of many investors who quickly update all available information in assessing each individual firm's market value (McWilliams and Seigel (1997).

There are alternative methodologies for carrying out event study (MacKinlay, 1997). Following Brown and Warner (1985) to measure the abnormal performance of KSE listed firms, the daily abnormal returns mean adjusted return approach and market model. The mean adjusted returns for each and following the event is:

$$AR_{it} = R_{it} - \overline{R}_i \tag{1}$$

Where AR_{it} is the abnormal or excess return for each stock i, R_{it} is actual return for stock i and $\overline{R}_i$ is the mean of the return in the estimation period.

The standard market model event methodology is also adopted (MacKinlay, 1997), where the returns on underlying stocks are assumed to be jointly multivariate normal and independently and identically distributed through time. The expected return for a given stock is:

$$\begin{aligned} R_{it} &= \beta_0 + \beta_1 R_{mt} + \varepsilon_{it} \\ E(\varepsilon_{it}) &= 0, \text{var}(\varepsilon_{it}) = \sigma^2_{\varepsilon_{it}} \end{aligned} \tag{2}$$

Where R_{mt} is the market return and KSE 100 index is used as market index, the $\widehat{\beta}_0$ and $\widehat{\beta}_1$ are OLS parameters for the estimated period. These parameters are estimated for each stock leading up to last week of September 2005. Using these estimates for the market model, the daily unexpected return or abnormal returns (AR) are computed during the event period as follows:

$$AR_{it} = R_{it} - \widehat{\beta}_0 - \widehat{\beta}_1 R_{mt} \tag{3}$$

The date of event is t=0, the mean adjusted model and market model is estimated over 20 days from t=-30 to t=-11 relative to the event date. The primary event window is the event t=0 itself, the two windows for event date five days following the event (t = +5) and from the event date ten days following the event (t = +10). and 20 days following the event (t = +20). The 100 days prior to the event window is used as estimation window. The abnormal return observations are aggregated across N stocks and through t time to draw overall inferences[2]. For longer windows cumulative average abnormal returns are computed[3] for each sample using t-statistics described in Brown and Warner (1985).

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[2] $A\overline{R} = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$ and $\widehat{\sigma}^2(A\overline{R}_i) = \frac{1}{N^2}\sum_{i=1}^{N} \widehat{\sigma}^2_{\varepsilon_{it}}$

[3] Across two time periods t_1 and t_2

In the next stage to assess how this event affects the stock returns, volume and volatility, the market model is used because the market model is simple econometric model with less strong statistical assumptions than capital asset pricing model (CAPM). The estimation and testing is carried out under assumption that the error term and hence the stock returns follow a normal distribution with a constant variance. Schipper and Thompson (1983), Jong, *et al* (1992), Arora (2001) and several other studies have used market model. The empirical evidence shows that the return distribution is time varying in nature and investors update the mean and variances at the arrival of information. Therefore the market model is extended to capture this effect with conditional variance by using the Generalized Autoregressive Conditional Hetroskedatic (GARCH) model of Bollerslev (1986). The ARCH models, originally introduced in Engle (1982) are useful to study the pattern of volatility clusters in a series. These models have been quite successfully applied to test for event study of some other stock market[4]. The variance of ARCH model is specified as conditional upon shocks observed in past, the past estimation of variance and other information in the form of exogenous variable. Bollersher (1986) extended the work of Engle (1982) by developing a technique that considers ARMA process in ARCH variance. This is called generalized ARCH or GARCH model. In GARCH model residuals are decomposed into heteroskedastic and express conditional moments because they provide close and parsimonious approximation to the form of hetroskedasticity typically encountered with financial time series data. Therefore market model-with-GARCH(1,1) specification given below is most suitable choice to investigate the effect of October 8, earthquake in case of Pakistani market:

$$R_{it} = \beta_0 + \beta_m R_{mt} + \sum_{i=1}^{p} \alpha_i r_{t-i} + \sum_{j=0}^{q} \beta_j \varepsilon_{t-j} + \varepsilon_{it} \tag{4}$$

$$h_t = \phi_0 + \sum_{k=1}^{l} \phi_k \varepsilon_{t-k}^2 + \sum_{m=1}^{s} \lambda_m h_{t-m} \tag{5}$$

This is our empirical specification of market model with autoregressive moving average (ARIMA) specification is given in equation (4). In equation (4) β_0 is the constant, β_m are asset sensitivity to market return and ε_{it} is idiosyncratic error term. The terms with p and q are orders of (AR) and moving average (MA) terms to yield ARMA (p, q) process. In equation

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$$\overline{CAR}(t_1,t_2) = \frac{1}{N}\sum_{i=1}^{N} \overline{AR}(t_1,t_2) \quad \text{and} \quad \text{var}[\overline{CAR}(t_1,t_2)] = \frac{1}{N^2}\sum_{i=1}^{N} \sigma_i^2(t_1,t_2)$$

[4] Jong *et al.* (1992) for Dutch Stock Market and Javed and Ahmed (2000) for Pakistani Stock Market.

(5) i and s are order of AR and MA terms in heteroskedastic variance and ϕ_k is called ARCH coefficient of order k and λ_m the GARCH coefficient of order m. If a stock is associated with higher risk it is expected to yield higher return. Hence volatility of risk, represented by variance equation (3) of return attempts to explain the increase in expected return due to past variances and errors.

The GARCH equation (5) allows heteroskedasticity in the time series of residuals and variances which represents the special feature of stock prices. It is typically observed that stock prices series contain periods of large volatility followed by periods of relative stability. The instability in stock markets introduced by some major shocks usually initiates a spell of fluctuations. These fluctuations partly reflect the genuine response of agents to continuously revising information. Another reason could be that not all agents jump on the 'band-wagon' of 'mass psychology' therefore some of to the shock the reaction could be delayed. Furthermore, agents may have sticky expectations regarding the consequence of the shock on share prices. The volatility clusters generated by any shock are not made of shocks in the same direction. For example following a bad news not all the price fluctuations are in the downward direction; the period of volatility would include negative as well as positive changes, reflecting 'technical correction' and reaction to delayed information respectively. Therefore the inertia in volatility causes autocorrelation in the size of random fluctuations ignoring their algebraic signs and it cannot be properly captured by the conventional linear autocorrelation in residuals. The GARCH equation that captures this inertia is a simple ARMA process in squared residuals and variances.

After estimating the GARCH model, the next step in our context is to estimate the series of GARCH variance given in equation (5). The GARCH variance along with the series of average return and volume are then examined to determine their responses to October 8, 2005 earthquake in Pakistan. The period was crucial for the stock market because this disaster occurred at a time when the stock market was recovering rapidly after the crash of March 2005. The shock was unanticipated therefore it is expected that KSE market will response to this unanticipated shock. When the quake struck the northern areas the market was in strong bullish phase so it is difficult to separate the effect of this event[5]. Thus to analyze the impact

[5] Henderson (1990) has observed that if the type of event under study has a greater probability of occurring in a bull market than bear market, it creates a problem.

of this event on KSE, we define an impulse event dummy D, which takes value zero before the earthquake and one from October 10, 2005 to October 31, 2005 and again zero afterwards. The reason is that, after absorbing the shock of massive death and destruction in the quake struck northern areas of Pakistan stocks were back in the rally and investors and brokers resumed their normal positions. However the post quake grief and sorrow still dominated, but the economy could hardly remain uncovered after such huge tragedy.

To determine the response of KSE to the event we postulate the following relationships:

$$R_{it} = \beta_0 + \beta_m R_{mt} + \beta_D D + \sum_{i=1}^{p} \alpha_i r_{t-i} + \sum_{j=0}^{q} \beta_j \varepsilon_{t-j} + \varepsilon_t \quad (6)$$

$$h_t = \phi_0 + \phi_D D + \sum_{k=1}^{l} \phi_k \varepsilon_{t-k}^2 + \sum_{m=1}^{s} \lambda_m h_{t-m} \quad (7)$$

$$V_i = \gamma_0 + \gamma_D D + \sum_{i=1}^{p} \theta_i V_{t-i} + \sum_{j=0}^{q} \delta_j \varepsilon_{t-j} + \varepsilon_t \quad (8)$$

In these equations R_{it}, h_t and V_i denote mean return, GARCH variance and the natural logarithm of trade volume respectively. D is an event dummy to capture the effect of Oct 8, 2005 event. Then GARCH variance is obtained to analyze volatility behavior due to earthquake shock by including event dummy. The volume model is also estimated with ARMA specification and event dummy to examine the activity of KSE before and after this event.

Data

For this analysis 60 firms are selected listed on Karachi Stock Exchange, which is the largest stock market in the country in terms of volume and capitalization. In selecting the firms three criteria are used (1) continuous listing on exchange for the period of analysis, (2) representative of almost all the important sectors and (3) with high turnover in their particular sector. The data on closing price, turnover and KSE 100 index is taken from the website of Business Recorder. Thus the three indicators of stock market activities used for analysis are average return, volume and volatility on the basis of daily data. The study is based on daily observations ranging from January 2005 to December 2006. The data for Karachi Stock Exchange is taken from the web site of business recorder. The data on dividends, rights issue and bonus shares is obtained from the annual reports of the firms,

5 Empirical Findings

The excess return and market model is used to investigate the response of firms to this natural disaster. To analyze the effect of earthquake on return and volatility, the market model is used as benchmark model. The stock return distribution are time varying in nature the model is extended to generalized autoregressive heteroscedasticity (GARCH) model. The extended model is applied on 60 listed firms to capture the effect of this event by allowing an event dummy variable. The GARCH variance is obtained to examine the effect on volatility by adding an event dummy and volume is modeled as ARMA specification with event dummy.

The first step of estimation is to calculate the daily stock returns. The returns are calculated as first difference of natural logarithm of dividend adjusted stock prices following Fama (1965)[6]. Then to test the stationary properties of returns the augmented Dicky Fuller (ADF) test is applied and the results indicate that stock returns and log volume series are stationary.

Table: Evidence on Abnormal Returns

	Excess Return	Market Model
first Day	-1.32* (-6.66)	-3.70** (-4.31)
6 day AR	0.92 (3.34)	0.87 (4.62)
6 Day CAR	0.06 (2.19)	0.04 (0.01)
11-day AR	0.11 (2.77)	0.01 (1.95)
11-day CAR	0.01* (7.39)	0.56 (4.04)
21 day AR	0.30 (3.54)	0.26 (0.53)
21 day CAR	0.01* (6.25)	0.12* (16.45)

Note: The values reported in the parenthesis are the t-value, * represent significance at 1%, ** significance at 5% and *** significance at 10% level respectively

The results of abnormal returns with the mean excess return and market model there is evidence of the event effect on first trading day on valuation of the firms. The market was closed on Oct 8, 2005; the effect is captured in the returns of day one on October 10, when the market reopened. The abnormal returns are found negative and significant. The first day abnormal returns AR are interesting in that they show immediate investor reaction to the

[6] $r_{it} = \ln(P_t) - \ln(P_{t-1})$, where r_{it} is return on i stock and P_t is dividend adjusted price of stock *i.*

event. The cumulative abnormal returns CAR provides an indicator of the capital marker resilience and ability to bounce back from the repercussions of the event. The CAR for 11 day improved and not statistically significant natural disaster. Following the earthquake the market rebound, 21-day CAR is positive and not statically different from zero. It takes Oct 10 to Oct 12 (three trading days) when the KSE 100 index returned to its pre-vent level. In case of Kobe earthquake the market recovered after 15 trading days. Therefore Pakistani market is resilient and quicker to absorb news of cataclysmic events. The evidence support the hypothesis that event convey information and immediately reflected in the prices. After the first trading day the bad news has no impact on the market as shown by positive and insignificant excess returns. The CAR results show that the market gradually responses and CAR gradually drift down over the event period. On the day after the event the CAR is relatively stable and there is a slight but statistically insignificant increase from day two to onwards.

The market model-with-GARCH model is estimated for all 60 firms. The identification of the properties of the return generating process is important in time series estimation of the model. To diagnose the specification of ARMA and ARCH process Box-Jenkins procedure is used (Box and Jenkins, 1976). These diagnostic procedures involves determination of order of autoregressive (AR) and moving average (MA) terms in the market model equation and order of ARCH and GARCH terms in ARCH equation (Ender, 1995). The procedure is based on a careful analysis of correlograms for autocorrelation and partial autocorrelation function. In addition various performance criteria such as Akaike information criteria and Schwartz Baysian Criteria are also used to make choices when more than one specification looks equally good. (Enders, 1995). The next step is to estimate market model with ARMA terms and check residuals and square residuals for autocorrelation. If some autocorrelation is still present the ARMA specification of equation is adjusted and estimated in the light of additional information. This stepwise procedure is continued until regression residuals are white noise. In the same way ARCH equation and its generalized form are specified except that the correlogram are drawn for square residuals, until Q-statistic for autocorrelation in square residuals turn insignificant at all meaningful lag lengths. These diagnostic steps should involve simultaneous study of correlogeanous for residual and square residuals.

The results show presence of a significant autoregressive process of first order; the coefficients of AR are significant. This pattern indicates that disturbances experienced as

included in information set during any period have permanent effect on future time paths of return. In other words the shocks in rates of returns experienced during a period have a rigid relationship with future returns. However, the impact of a shock as given in information set declines geometrically with the increase in lag length. The intercept term in market model with ARMA equation measures systematic component of average rate of return. The ARCH and GARCH equations parameterize conditional variance, and intercept of these equations shows the portion of price volatility that remains constant overtime.

The estimation of market model-with-GARCH is carried out by Maximum Likelihood Estimation procedure. The result of this test is reported in appendix Table A3. The results indicate a positive relation between stock return and market return as shown by market β. In all cases ARCH (1) and GARCH (1) are found to be present at 1% significance level these results show that the estimates of past square residuals and past variances affect the conditional variance significantly.

After estimating the GARCH model, the series of GARCH variances is extracted. This series along with average return and the volume given in the equation (6), (7) and (8) are estimated to determine the responses to the earthquake and the results are reported in Table 3. These results reveal the fact that earthquake had both positive and negative information content for KSE stocks. It is interesting to find that that returns of banking and financial sector experience negative effect on average return but positive effect on the volume (For example, Askari Commercial Bank, Askari Leasing, Bank of Punjab, and National Bank of Pakistan, Unicap Modarba), but Muslim commercial Bank and PICIC Commercial Bank witness appositive effect on return and volume. The investors' immediate reaction in the cement, food and chemical and pharmaceutical is positive as indicated by posit6ive effect on the average returns and volume of these sectors (Nestle Milkpack, Michelle fruit, Lever Brothers, ICI Pakistan, Engro Chemical Maple Leaf Cement, Lucky Cement, Fauji Cement. The firms Pakistan Tobacco, Pakistan Services have experienced positive effect on volume and no effect on return. In textile sector, Gul Ahmed, Elcot Spinning and Dewan Salman Fabrics show a negative effect on return but experience a positive effect on volume. Satara Chemicals, Metropolitan Steel, Mirpurkhas Sugar, Mandviwala Plastic and Prime Modarba have positive effect on volume, negative impact on volatility and no impact on return. The National refinery, Faisal Spinning, Fauji Cement, Metropolitan Steel, Mirpurkhas Sugar and Mandviwala Plastic have shown negative trend in volatility where as the volatility of Bank of

Punjab, Cherat Cement, OGDC, Pakistan Tobacco, Unicap Modarba has positive volatility effects The post quake trading period is marked by fresh buying orders in bank, oil and cement sector. The price rise on the leading stocks continued bullish but low daily volume reflected that investors generally played safe as the crash of the last March remained a guiding force for them. After absorbing the shock, stocks are back in the rally as investors covered their position in the cement, food, oil, pharmaceuticals and banking sector followed by the higher sales with the reconstruction work in the devastated area started. Some other sectors including textile and those which are directly associated with construction work and also remained in active demand had high return.

These results are expected the increase volume obviously resulted from extraordinary selling pressure on food, chemical and pharmaceutical, cement industry and banks as investors attempted to off-loaded their holdings. There is increase in the volatility which is most significant in the case of only 10 firms (Bank of Punjab, Muslim Commercial Bank, Cherat Cement, Metropolitan Steel, Hub power, ICI, Pakistan Oil, Unicap Moderaba and Mandiviwala Plastic) and in the rest of the firms it is mix but not significant. One explanation could be that after crash of March 2005, the investors were taking safe positions hock did not affect the volatility much. The overall significance of the model is tested by applying the F-Test. The results of the three equations of average return, volatility and volume show the F-Statistics is reasonably high which shows that the overall model is significant at 5% level.

These expectations are formed in the backdrop of generally held perception that demand of commodities needed for reconstruction increase and in such firms started producing in full capacity. It was also expected that Pakistan will receive response in the form of foreign aid and to some extent these expectations turn out to be true. This evidence suggests that firms activities listed at the Karachi Stock Market are responsive to unanticipated events and it takes no time to show this response. After absorbing the shock the stocks were back in the rally as investors covered their positions in the cement, steel, pharmaceuticals and banking sector followed by the perdition of higher sales when the construction work in the devastated areas started.

Table 3 Affect of Earthquake on Return, Volume and Volatility of KSE Firms

	ABOT	AICL	ASKB	ASKL	BATA	BOP	BTML	CHCC	DHCL	FFBQ
RETURN										
β_0	0.01	0.12	0.02	0.04	-0.11	0.01	-0.05	-0.11	0.02	0.04
	(-0.34)	(1.34)	(0.44)	(0.20)	(-0.29)	(1.63)	(-1.11)	(-0.07)	(0.01)	(0.22)
β_m	0.57*	0.38*	0.34*	0.14**	0.01*	0.61*	0.32*	0.09***	0.16*	0.13*
	(2.21)	(4.45)	(3.44)	(1.96)	(2.10)	(6.26)	(2.13)	(1.71)	(2.39)	(2.02)
β_D	0.11	0.13	0.01**	-0.11**	0.03**	-0.02*	0.03	0.12***	0.21	-0.01
	(-0.01)	(-1.57)	(-1.92)	(-1.94)	(1.87)	(-3.08)	(0.59)	(1.82)	(0.51)	(-0.48)
α_1	0.11	0.16*	0.14*	-0.05	0.20*	-0.12**	-0.10*	0.11	-0.03***	-0.12
	(1.63)	(2.48)	(2.44)	(-1.26)	(4.35)	(-1.91)	(-2.23)	(1.63)	(-1.67)	(-1.61)
R^2	0.39	0.27	0.05	0.39	0.40	0.16	0.29	0.22	0.21	0.29
F	19.33	17.54	25.22	15.06	72.46	14.46	31.29	19.33	20.09	21.96
VARIANCE										
ϕ_0	0.11	0.07	0.12	0.11	0.01	0.12	0.04	0.01	0.12	0.11
	(1.6)	(9.68)	(8.65)	(10.06)	(14.78)	(1.06)	(33.35)	(9.97)	(13.28)	(5.86)
ϕ_D	0.04	0.01	0.01	-0.31	0.13	0.11***	0.12	0.20*	0.41	0.10
	(0.61	(1.15)	(-0.24)	(1.37)	(0.23)	(1.85)	(0.14)	(4.59)	(0.07)	(0.68)
ϕ_1	0.09	0.16	0.74*	0.76*	0.67*	0.20	0.58*	0.35*	0.76*	0.90*
	(3.13)	(0.12	(17.08)	(20.82)	(13.57)	(1.12)	(7.60)	(2.11)	(20.52)	(41.96)
λ_1	0.17	0.12	0.12	-0.03	-0.001	0.11	-0.13	-0.03	0.07*	0.13*
	(0.65)	(0.09)	(0.65)	(-0.57)	(-0.13)	(0.54)	(-1.42)	(-0.17)	(2.14)	(2.61)
R^2	0.63	0.36	0.55	0.60	0.45	0.3	0.29	0.24	0.63	0.85
F	53.38	64.25	145.71	241.50	132.32	16.97	47.70	22.28	267.53	884.6
VOLUME										
γ_0	17.26	8.60	8.24	0.34	5.94	15.37	4.29	14.02	12.55	19.55
	(76.13)	(32.50)	(50.30)	(5.39)	(3.68)	(42.17)	(3.51)	(32.21)	(6.11)	(17.56)
γ_D	-0.37**	0.31	0.09*	-1.12	0.51	0.69	-0.68	0.086***	1.26*	-0.33
	(-1.85)	(0.85)	(2.42)	(-0.70)	(0.27)	(1.58)	(-0.48)	(1.67)	(4.71)	(-1.09)
θ_1	0.76*	0.80*	0.57*	0.98*	0.95*	0.87*	0.96*	0.94*	0.76*	-0.87*
	(11.91)	(8.52)	(3.53)	(64.91)	(46.11)	(21.27)	(50.16)	(47.17)	(11.51)	(-29.5)
δ_1	-0.19*	-0.55*	-0.29	-0.89*	-0.77*	-0.23*	-0.84*	-0.64*	-0.48*	-0.31*
	(-1.96)	(-4.37)	(-1.55)	(-28.53)	(-17.80)	(-2.83)	(-22.48)	(-13.92)	(-5.36)	(-5.48)
R^2	0.45	0.28	0.30	0.26	0.37	0.70	0.28	0.54	0.29	0.56
F	54.65	142.67	9.08	31.76	59.57	181.03	361.7	192.29	68.69	211.15

Continued on the next page

(continued) **Table 3 Affect of Earthquake on Return, Volume and Volatility of KSE Firms**

	ABOT	AICL	ASKB	ASKL	BATA	BOP	BTML	CHCC	DHCL	FFBQ
RETURN										
β_0	0.11	-0.12	0.11	-0.40	-0.21	-0.20	0.22	0.13	0.11	0.21
	(0.40)	(0.940	(0.56)	(-1.08)	(-0.91)	(-0.03)	(1.15)	(2.18)	(1.89)	(0.03)
β_m	0.05**	0.01*	0.25*	0.03*	0.04*	0.47*	0.47*	0.72*	0.92*	0.62*
	(1.86)	(2.21)	(3.88)	(2.21)	(2.41)	(7.64)	(7.64)	(10.42)	(15.17)	(7.84)
β_D	-0.33	0.12	0.08*	0.11	0.31	0.21**	0.11**	0.10*	-0.22***	0.11
	(-0.82)	(1.01)	(2.48)	(1.07)	(0.48)	(1.93)	(1.84)	(1.97)	(-1.69)	(0.03)
α_1	0.21*	0.04	-0.07	-0.21*	-0.13*	-1.07*	0.10	-0.11	-0.22*	-0.07
	(4.55)	(0.92)	(-1.31)	(-4.63)	(-2.94)	(-3.67)	(1.54)	(-1.63)	(-3.16)	(-1.06)
R^2	0.43	0.44	0.25	0.45	0.28	0.29	0.36	0.28	0.37	0.21
F	73.54	71.01	20.86	77.21	30.96	48.39	61.88	87.71	71.57	28.57
VARIANCE										
ϕ_0	0.11	0.02	0.31	0.21	0.11	0.22	0.14	0.11	0.20	0.13
	(1.19)	(5.36)	(6.20)	(129.1)	(6.55)	(6.69)	(3.39)	(18.25)	(2.24)	(2.52)
ϕ_D	0.12	0.11***	-0.20***	0.12	-0.01	-0.22	0.13	-0.11	0.12	0.11
	(0.72)	(1.71)	(1.86)	(0.14)	(-0.07)	(-0.50)	(0.33)	(-0.06)	(0.19)	(1.35)
ϕ_1	0.72	0.91*	0.94*	0.97*	0.83*	0.93*	0.91*	0.41*	0.96*	0.62*
	(16.65)	(47.89)	(57.53)	(8.87)	(31.04)	(12.00)	(33.37)	(6.83)	(53.08)	(12.08)
λ_1	0.01	0.14*	-0.22	0.10*	0.45*	-0.90*	-0.02*	-0.11*	0.02	-0.03*
	(0.17)	(2.89)	(-0.06)	(2.09)	(9.39)	(-9.78)	(-2.33)	(-3.31)	(0.98)	(2.89)
R^2	0.53	0.87	0.89	0.95	0.84	0.88	0.84	0.25	0.36	0.40
F	182.6	1040.8	1377.2	322.11	852.78	142.8	597.49	30.09	148.9	79.50
VOLUME										
γ_0	13.18	17.97	17.53	9.71	13.86	10.93	14.48	15.41	16.71	14.97
	(44.97)	(59.24)	(30.65)	(6.57)	(29.38)	(14.92)	(17.85)	(62.66)	(94.10)	(58.44)
γ_D	0.26	0.03	-0.43	-1.82	0.19	0.30	1.12**	1.07*	0.29*	0.84*
	(0.42)	(0.83)	(-0.69)	(-1.41)	(0.37)	(0.35)	(1.81)	(3.40)	(1.97)	(2.53)
θ_1	0.86*	0.91*	0.95*	0.98*	0.94*	0.95*	0.95*	0.81*	0.84*	0.83*
	(23.58)	(36.25)	(55.95)	(69.86)	(54.44)	(30.74)	(40.90)	(15.13)	(15.06)	(15.30)
δ_1	-0.48*	0.51*	-0.53*	-1.02*	-0.53*	-0.91*	-0.40*	-0.22*	-0.44*	-0.31*
	(-7.79)	(-9.72)	(-11.62)	(63.77)	(-11.57)	(-19.78)	(-5.92)	(-2.51)	(-4.75)	(-3.41)
R^2	0.56	0.58	0.65	0.42	0.64	0.34	0.86	0.63	0.41	0.61
F	204.04	220.46	302.66	70.88	282.48	57.71	498.26	133.71	55.34	89.97

Continued on the next page

(continued) **Table 3 Affect of Earthquake on Return, Volume and Volatility of KSE Firms**

	ABOT	AICL	ASKB	ASKL	BATA	BOP	BTML	CHCC	DHCL	FFBQ
					RETURN					
β_0	-0.13 (-1.46)	-0.11 (-0.66)	0.06 (0.33)	0.12 (0.12)	-0.11 (-0.15)	0.22 (0.94)	0.12 (0.57)	0.11 (0.07)	-0.23 (0.11)	0.01 (-0.11)
β_m	0.26* (2.60)	0.09* (1.99)	0.06* (2.82)	0.02* (2.44)	0.05* (2.28)	0.26* (3.92)	0.02* (2.43)	0.17* (2.79)	0.31* (3.49)	0.18* (2.77)
β_D	0.12 (0.67)	0.20* (2.14)	-0.22 (-0.71)	0.23** (1.87)	0.11* (3.79)	-0.22 (-0.81)	0.12 (0.76)	0.04 (0.02)	0.23* (1.95)	-0.14 (-0.42)
α_1	-0.13* (-2.84)	0.16 (2.82)	0.11* (2.14)	-0.07 (-1.59)	-0.08*** (-1.69)	0.09** (1.91)	0.15* (3.37)	-0.09** (1.90)	0.09 (0.14)	-0.13* (-2.00)
R^2	0.28	0.30	0.29	0.36	0.36	0.40	0.25	0.23	0.21	0.46
F	47.08	64.24	31.86	44.51	71.32	66.80	41.93	38.17	42.16	387.1
					VARIANCE					
ϕ_0	0.20 (19.78)	0.33 (13.61)	0.07 (8.62)	0.13 (9.40)	0.40 (0.20)	0.05 (2.72)	0.14 (4.88)	0.16 (12.56)	0.11 (4.64)	0.11 (1.75)
ϕ_D	-0.11 (-0.46)	0.12 (0.42)	-0.13** (-1.80)	0.14 (1.43)	0.12 (0.82)	0.11** (1.73)	-0.21 (-0.48)	0.10** (1.83)	-0.11 (-0.42)	-0.21 (-0.87)
ϕ_1	0.62* (7.88)	0.66* (12.36)	0.76* (20.17)	0.74* (18.62)	0.73* (15.38)	0.96* (66.96)	0.88* (37.22)	0.82* (26.86)	0.73* (17.41)	0.98* (44.62)
λ_1	-0.29* (-2.97)	-0.33 (-0.49)	0.02 (0.30)	-0.40 (-0.08)	-0.09 (-1.33)	0.07 (1.41)	0.19* (3.99)	0.17* (3.21)	0.05 (0.08)	-1.03* (-35.79)
R^2	0.37	0.49	0.60	0.57	0.46	0.91	0.84	0.76	0.54	0.67
F	82.39	111.06	248.6	210.03	133.09	1623.9	823.2	507.56	190.59	57.13
					VOLUME					
γ_0	10.47 (-10.90)	4.26 (5.85)	15.97 (69.96)	4.46 (6.94)	9.31 (1.90)	21.81 (87.67)	1.52 (2.18)	8.86 (11.08)	15.51 (17.17)	8.60 (32.49)
γ_D	-0.55 (-0.50)	-0.07 (-0.75)	-0.43 (-1.49)	2.57* (3.03)	1.52** (1.7 6)	-0.13 (-0.40)	1.90* (2.11)	3.81* (3.76)	0.35** (1.97)	0.31 (0.85)
θ_1	0.93* (42.1)	0.79* (13.22)	0.75* (14.56)	0.65* (5.03)	1.00* (14.66)	-0.83* (24.23)	0.77* (12.27)	0.85* (19.03)	0.87* (23.61)	0.80* (8.52)
δ_1	-0.58* (11.99)	-0.55* (-6.62)	0.27* (-3.70)	-0.49* (-3.22)	-0.69* (-18.99)	-0.25* (-4.11)	-0.50* (36.19)	-0.64* (-9.24)	-0.39* (-6.97)	-0.55* (-4.37)
R^2	0.47	0.56	0.35	0.38	0.83	0.54	0.28	0.28	0.52	0.77
F	147.91	29.73	86.18	64.41	805.38	186.91	36.19	61.52	176.63	71.10

Continued on the next page

(continued) **Table 3 Affect of Earthquake on Return, Volume and Volatility of KSE Firms**

	ABOT	AICL	ASKB	ASKL	BATA	BOP	BTML	CHCC	DHCL	FFBQ
					RETURN					
β_0	0.30	0.11	-0.07	0.21	0.17	0.20	-0.31	0.02	-0.33	0.10
	(2.05)	(0.86)	(-0.41)	(0.55)	(0.37)	(0.43)	(-0.51)	(0.14)	(-1.09)	(0.43)
β_m	0.57*	0.12**	0.88*	0.27*	0.07*	0.28*	0.09*	0.04*	0.15*	0.14**
	(8.84)	(1.83)	(13.42)	(2.62)	(2.32)	(3.71)	(2.06)	(.2.40)	(2.70)	(1.82)
β_D	-0.11	0.12	0.01*	0.11	-0.11	0.33	0.11	-0.02	0.14	0.13*
	(-0.27)	(0.29)	(2.09)	(0.17)	(-0.36)	(0.24)	(1.36)	(-0.06)	(1.10)	(0.12)
α_1	-0.18*	0.13	-0.30	0.10*	0.30*	0.04	0.11***	0.08	0.09**	0.06
	(-2.82)	(0.45)	(-0.83)	(2.24)	(6.90)	(0.54)	(1.78)	(1.92)	(1.95)	(0.88)
R^2	0.22	0.37	0.25	0.40	0.29	0.57	0.25	0.47	0.22	0.24
F	31.05	27.69	21.59	67.25	96.29	48.35	42.48	94.10	35.38	19.39
					VARIANCE					
ϕ_0	0.02	0.05	0.23*	0.10	0.40	0.11	0.16	0.07	0.001	0.05
	(2.16)	(4.04)	(2.11)	(6.01)	(5.30)	(1.97)	(5.65)	(5.35)	(17.17)	(6.84)
ϕ_D	0.002*	-0.14	0.11	-0.21	-0.02	0.10	0.30	-1.63	0.40	0.20
	(2.10)	(-0.29)	(0.70)	(-0.70)	(-0.02)	(0.16)	(0.33)	(-0.11)	(0.51)	(0.39)
ϕ_1	0.76*	0.93*	0.63*	0.93*	0.80*	0.99*	0.93*	0.91*	0.79*	0.94*
	(16.59)	(52.76)	(9.63)	(53.52)	(24.22)	(88.01)	(53.19)	(44.56)	(21.83)	(38.41)
λ_1	0.26*	0.17*	0.30*	0.09*	0.08	-0.33	0.22*	0.10**	-0.02	0.05
	(4.12)	(3.59)	(3.71)	(2.06)	(1.43)	(-0.05)	(4.39)	(1.98)	(-0.32)	(0.71)
R^2	0.76	0.90	0.59	0.89	0.68	0.97	0.91	0.85	0.61	0.89
F	249.4	1515	113.3	1430	344.54	268.4	1546	956.6	251.69	641.3
					VOLUME					
γ_0	15.87	21.77	17.76	21.05	2.14	10.01	17.66	19.19	6.91	5.47
	(89.95)	(99.75)	(11.67)	(14.81)	(3.84)	(22.62)	(37.95)	(46.94)	(8.09)	(29.56)
γ_1	-0.09	-1.35*	0.20	0.44*	-0.28	0.11	-0.07	-1.01*	0.87	0.93*
	(-0.37)	(-4.93)	(0.04)	(2.45)	(-0.39)	(0.17)	(-0.15)	(-2.13)	(0.80)	(3.80)
θ_1	0.76	0.85*	0.71*	0.77*	-0.78*	0.85*	0.95*	0.92*	0.82*	0.78*
	(11.12)	(24.04)	(8.83)	(15.96)	(10.24)	(21.91)	(64.28)	(41.64)	(15.42)	(9.31)
δ_1	-0.29	-0.37*	-0.25*	-0.32*	-0.57*	-0.26*	-0.51*	-0.33*	-0.56*	-0.46*
	(-2.87)	(-6.04)	(-2.26)	(-4.44)	(-5.72)	(-3.39)	(-11.39)	(-6.41)	(-7.22)	(-3.89)
R^2	0.35	0.64	0.44	0.39	0.22	0.60	0.71	0.72	0.79	0.41
F	42.06	281.4	61.38	64.41	805.38	117.9	396.77	410.91	351.1	55.45

Continued on the next page

(continued) **Table 3 Affect of Earthquake on Return, Volume and Volatility of KSE Firms**

	ABOT	AICL	ASKB	ASKL	BATA	BOP	BTML	CHCC	DHCL	FFBQ
RETURN										
β_0	0.30	-0.22	0.11	0.14	-0.10	0.33	-0.02	-0.21	-0.20	-0.31
	(0.23)	(-1.07)	(-0.51)	(0.29)	(-0.74)	(0.98)	(-0.57)	(-0.34)	(-0.49)	(-1.19)
β_m	0.03*	0.01*	0.06**	0.12*	0.13*	0.07**	0.08**	0.03**	0.30*	0.02*
	(2.63)	(2.11)	(1.86)	(2.08)	(2.93)	(1.95)	(1.71)	(1.96)	(1.99)	(2.23)
β_D	0.10	0.12	0.11	0.10*	-0.22*	0.30	0.05	0.22	0.10	0.12
	(0.64)	(0.34)	(0.29)	(2.01)	(-7.29)	(0.47)	(0.98)	(0.09)	(0.26)	(0.72)
α_1	0.10*	0.06	-0.22	-0.32	-0.10*	0.25*	0.18*	-0.04	-0.19*	-0.06
	(2.14)	(1.26)	(-1.04)	(-0.56)	(2.11)	(5.47)	(3.92)	(-0.89)	(-4.11)	(-1.29)
R^2	0.24	0.38	0.33	0.25	0.22	0.66	0.04	0.29	0.38	0.54
F	22.79	61.75	31.31	41.45	54.86	49.11	65.45	31.90	63.52	39.34
VARIANCE										
ϕ_0	0.10	0.05	0.20	0.15	0.05	0.11	0.20	0.11	0.40	0.11
	(3.69)	(12.38)	(4.55)	(-5.90)	(5.40)	(8.08)	(27.29)	(28.29)	(19.38)	(7.83)
ϕ_D	-0.30	0.22	0.04	-0.12	0.33	-0.21***	-0.30*	-0.22	-0.20	0.11
	(-1.39)	(0.55)	(0.92)	(-0.20)	(0.39)	(-1.66)	(-2.96)	(-0.70)	(-0.99)	(0.71)
ϕ_1	0.85*	0.54	0.67	0.88*	0.93*	0.93*	0.78*	0.03	0.48*	0.87*
	(31.12)	(1..52)	(1.18)	(36.70)	(10.57)	(51.14)	(23.28)	(-0.07)	(6.33)	(34.32)
λ_1	0.02	-0.11	-0.67**	-0.03	-0.02	0.05	0.07	0.07	0.08	0.08
	(0.41)	(-0.93)	(1.78)	(-0.59)	(-0.49)	(1.05)	(1.25)	(0.15)	(0.88)	(1.50)
R^2	0.75	0.31	0.29	0.76	0.95	0.89	0.70	0.22	0.29	0.79
F	47.29	72.81	30.83	540.7	3741	1369	363.9	71.65	64.55	302.9
VOLUME										
γ_0	11.74	8.53	22.71	17.85	4.95	7.94	7.24	11.22	9.28	13.68
	(0.55)	(7.03)	(4.94)	(54.79)	(4.06)	(12.24)	(6.90)	(5.33)	(9.63)	(26.67)
γ_D	0.07*	1.22	-11.66**	0.36**	0.28	3.95*	2.42**	-0.50	-0.61	0.62
	(0.05)	(0.83)	(-1.95)	(1.72)	(0.12)	(4.78)	(1.88)	(-0.27)	(-0.53)	(1.20)
θ_1	0.98*	0.95*	0.71	0.90*	0.92*	0.85*	0.94*	0.99*	0.93*	0.96*
	(69.53)	(43.07)	(1.20)	(37.31)	(33.62)	(15.23)	(33.45)	(88.52)	(34.22)	(64.82)
δ_1	-0.88	-0.79*	-0.73	-0.40*	-0.72*	-0.66*	-0.77*	-0.90*	0.73*	-0.66*
	(-28.64)	(-18.22)	(-1.26)	(-7.72)	(-14.26)	(-8.34)	(-15.42)	(-33.40)	(-14.57)	(-15.84)
R^2	0.72	0.24	0.76	0.69	0.24	0.28	0.25	0.38	0.22	0.58
F	33.49	49.54	1239	356.77	94.80	61.84	52.76	37.04	44.88	218.3

Continued on the next page

(continued) **Table 3 Affect of Earthquake on Return, Volume and Volatility of KSE Firms**

	ABOT	AICL	ASKB	ASKL	BATA	BOP	BTML	CHCC	DHCL	FFBQ
					RETURN					
β_0	-0.20	-0.31	0.11	-0.22	-0.11	-0.40	-0.12	-0.20	0.12	0.11
	(-0.97)	(-1.88)	(1.54)	(-0.57)	(-0.41)	(-1.96)	(-0.66)	(2.16)	(0.13)	(0.39)
β_m	0.05**	0.05*	2.00*	0.07*	0.73*	0.06*	0.04**	0.01*	0.14**	0.18**
	(1.93)	(1.91)	(2.83)	(2.72)	(9.25)	(3.31)	(1.86)	(2.31)	(1.93)	(1.95)
β_D	-0.12	0.31	0.12*	0.15	-0.23	0.14**	0.30	-0.12*	0.12	-0.23
	(-0..41)	(1.04)	(2.21)	(0.97)	(-0.69)	(1.92)	(1.04)	(-9.69)	(0.02)	(-0.23)
α_1	0.05	0.31*	0.06	0.18*	-0.29*	0.61*	0.10*	0.14*	-0.01	0.19*
	(1.08)	(7.17)	(0.97)	(3.92)	(-4.04)	(11.12)	(2.10)	(2.50)	(-0.14)	(3.31)
R^2	0.47	0.25	0.20	0.47	0.48	0.29	0.27	0.68	0.21	0.42
F	75.72	19.36	121.1	65.84	19.89	66.25	91.11	54.59	12.33	43.92
					Variance					
ϕ_0	-0.05	0.11	0.43	0.21	0.20	0.11	0.93	0.34	0.40 *	0.10
	(11.11)	(11.35)	(1.69)	(27.29)	(4.27)	(6.44)	(2.59)	(0.34)	(23.70)	(21.21)
ϕ_D	0.33	-0.50**	-0.42**	-0.22*	-.0.11	0.04**	0.63	0.41	-0.001	-0.002
	(0.13)	(-1.75)	(-1.84)	(-2.96)	(-.0.21)	(1.91)	(0.46)	(0.88)	(-0.58)	(-0.10)
ϕ_1	0.96*	0.60*	0.20*	0.79*	0.92*	0.85*	0.94*	0.90*	0.60*	0.96*
	(75.71)	(8.33)	(3.10)	(23.28)	(32.66)	(29.03)	(34.67)	(50.14)	(8.14)	(93.01)
λ_1	0.08	-0.16**	-0.09	0.07	0.11	-0.12*	-0.80*	0.02	0.03	0.12
	(1.56)	(-1.79)	(-1.76)	(1.25)	(0.12)	(-2.20)	(-16.70)	(0.32)	(0.34)	(0.02)
R^2	0.93	0.25	0.69	0.70	0.84	0.69	0.25	0.85	0.39	0.96
F	237.7	53.76	368.1	363.93	428.4	350.38	72.86	101.7	64.65	298.4
					Volume					
γ_0	2.24	-1.84	15.37	7.24	10.20	4.21	0.60	1.82	0.10	0.12
	(4.71)	(1.20)	(42.17)	(6.90)	(31.25	(4.73)	(11.05)	(2.93)	(13.22)	(3.64)
γ_D	-0.25	1.51	0.69	2.42	0.86*	0.44	-0.20	-1.99	0.002**	0.10*
	(-0.41)	(0.89)	(1.58)	(1.88)	(2.02)	(0.40)	(-0.31)	(-1.39)	(1.98)	(2.02)
θ_1	0.72	0.96	0.87	0.93	0.86	0.91	0.92*	0.95*	0.67*	0.17*
	(8.56)	(62.39)	(21.27)	(33.45)	(14.74	(27.29)	(46.63)	(52.13)	(16.22)	(12.01)
δ_1	-0.53	-0.81	-0.23	-0.77	-0.62	-0.72*	0.02	-0.85*	-0.05	0.02
	(-5.05)	(-22.59)	(-2.83)	(-15.42)	(-6.56	(-12.93)	(0.48)	(-23.72)	(-0.85)	(1.57)
R^2	0.79	0.30	0.70	0.25	0.33	0.80	0.85	0.66	0.57	0.60
F	71.33	68.82	181.03	52.76	39.69	35.38	910.8	32.11	37.88	95.27

Note: The values reported in the parenthesis are the t-value, * represent significance at 1%, ** significance at 5% and *** significance at 10% level respectively.

These expectations are formed in the backdrop of generally held perception that demand of commodities needed for reconstruction increase and in such firms started producing in full capacity. It was also expected that Pakistan will receive response in the form of foreign aid and to some extent these expectations turn out to be true. This evidence suggests that firms activities listed at the Karachi Stock Market are responsive to unanticipated events and it takes no time to show this response. After absorbing the shock the stocks were back in the rally as investors covered their positions in the cement, steel, pharmaceuticals and banking sector followed by the perdition of higher sales when the construction work in the devastated areas started.

The evidence suggests that earthquake both having positive and negative effects with offsetting each other and the overall market did not show any dominated effect of this event. The market was recovering rapidly after the crash of March 2005 was in bullish phase so the overall response of the market was not dominated by any significant impact of this natural disaster[7]. The quake was unanticipated but market was facing recovery phase so the overall market did not show much impact. However, the firm level analysis suggests that cement, steel, food, chemical and pharmaceutical and banking and financial sectors have shown immediate response due to future expected rising demand and by the end of October these shocks are absorbed and the KSE gained the grounds. The response of stock market to this natural disaster was expected and evidence suggests that the Pakistani stock market recovers soon from the shock. The major sector that has potential in promoting stability by providing liquidity is the banking and financial sector.

6 Conclusion

This study has examined the effect of event of Oct 8, 2005 on the price behavior and activities of KSE. For this analysis sixty firms are selected listed on Karachi Stock Exchange, which is the largest stock market in the country in terms of volume and capitalization. The event study methodology is used to assess how long it take the market to return to it's prevent level. To dig deeper in to impact of the disaster, the three indicators of stock market activities used for analysis are average return, volume and volatility on the basis of daily data from January 2005 to Dec 2006.

[7] Henderson (1990) observes that the event study can capture the effect of an event only if it is in bearish phase. McWilliams and Siegel (1997) have noted that the abnormal return associated with an event can only be truly identified when markets are efficient, event is unanticipated and there is no confounding effect during the event.

The investigation of the abnormal returns following the event indicates that KSE market is quicker to absorb the news of cataclysmic event and only three trading days are required to return to prevent level. The results of Market Model-with-GARCH specification indicate a positive relation between stock return and market return. In all cases ARCH (1) and GARCH (1) and found to be present at 1% significance level. These results show that the estimates of lagged square residuals and lag variances in conditional variance are significant. After estimating the model, the series of GARCH variances series is extracted. To the impact of this event of earthquake on the average return, volatility and volume of KSE model containing three equations for average return, volatility and volume are estimated. An event dummy is defined to capture the effect of quake.

These results have given some insight about the price behavior of the stock market in response to unanticipated shock. The increase in the return and volume of cement, steel, food, chemicals and pharmaceuticals and banking sector indicates that individual has expectation for the upcoming demand of investment in these sectors. Furthermore there is no significant increase in the volatility because the investors take lessons from the crash of March 2005 and are also seem certain about the future outlook. These expectations are formed in the backdrop of generally held perception that Pakistan will receive response in the form of foreign aid and to some extent these expectations turn out to be true. The implication which comes out of this study is that one can argue that the reaction of stock market to this natural disaster was not unexpected with any directions in any sense; it is consistent with the expectations of investors, policy maker, regulatory bodies, media and common people. The evidence suggests that the Pakistani stock market is resilient and it rebound and stabilizes quicker. Furthermore, the major sector that has potential in promoting stability by providing liquidity is the banking and financial sector. One can argue the efficient functioning of banking and financial sector is a major determinant of whether the capital market is able to withstand and quickly absorb exogenous and endogenous shocks.

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Appendix

Table A1: List of Companies included in the Sample

Name of Company	Symbol	Sector
Al-Abbas Sugar	AABS	Sugar and Allied
Abbott Laboratories Pakistan Ltd	ABOT	Chemicals and Pharmaceuticals
Askari Commercial Bank	ACBL	Insurance and Finance
Al-Ghazi Tractors	AGTL	Auto and Allied
Adamjee insurance Company	AICL	Insurance
Ansari Sugar	ANSS	Sugar and Allied
Askari Leasing Limited	ASKL	Leasing Company
Azam Textile mills Ltd	AZAM	Textile Composite
Bata Pakistan Ltd	BATA	Leather
Bal Wheels	BWHL	Auto and Allied
Bank of Punjab Ltd	BOP	Insurance and Finance
Brother Textile Mills Ltd	BROT	Textile Composite
Cherat Cement	CHCC	Cement
Cherat Papersack Ltd	CPAP	Paper and Board
Crescent Textile Mills	CRTM	Textile Composite
Crescent Steel	CSAP	Engineering
Comm. Union Life Assurance	CULA	Insurance and Finance
Dadabhoy Cement	DBYC	Cement
Dawood Harcules Chemical Ltd	DHCL	Fertilizer
Dhan Fibres	DHAN	Synthetic and Rayon
Dewan Salman Fibre	DSFL	Synthetic and Rayon
Dewan Textile	DWTM	Textile Composite
Engro Chemical Pakistan	ENGRO	Chemicals and Pharmaceuticals
Elcot Spinning Ltd	ELCOT	Textile Spinning
Emco Industries Limited	EMROC	Glass
Faisal Spinning.	FASM	Textile Spinning
Fauji Cement Ltd	FCCL	Cement
Fauji Fertilizer	FFCL	Fertilizer
Ferozsons Laborteries	FROZ	Chemicals and Pharmaceuticals
General Tyre and Rubber Co.	GTYR	Auto and Allied
Gul Ahmed Textile	GULT	Textile Composite
Habib Arkady Sugar	HAAL	Sugar and Allied
Honda Atlas Cars Ltd	HONDA	Auto and Allied
Hub Power Co.	HUBC	Power Generation & Distribution
I.C.I. Pak	ICI	Chemicals and Pharmaceuticals
Indus Motors	INDU	Auto and Allied
Indus Polyester Co Ltd	IPCL	Synthetic and Rayon
Japan Power Generation Co	JPPO	Power Generation & Distribution
Karachi Electric Supply Co.	KESC	Power Generation & Distribution
Lever Brothers Pakistan	LEVER	Food and Allied

Lucky Cement	LUCK	Cement
Muslim Commercial Bank	MCB	Commercial Banks
Maple Leaf Cement	MPLC	Cement
Metropolitan Steel Corporation	METRO	Engineering
Mohammad Farooq Textile mills	MFTL	Textile Composite
Michells Fruit Farms	MITCH	Food and Allied
Mandviwal Mansaur Plastic Co	MMPC	Miscellaneous
Mirpurkas Sugar Mill Ltd	MKSM	Sugar and Allied
National Bank of Pakistan	NBP	Insurance and Finance
Nishat Textile Mills Ltd	NTML	Textile Composite
National Refinery	NATR	Fuel and Energy
Nestle Milk Pak Ltd	NESTLE	Food and Allied
Oil and Gas Development Corporation	OGDC	Fuel and Energy
Orix Leasing	ORIX	Leasing Company
PICIC Commercial Bank	PICIC	Insurance and Finance
Prudential Modarba	PMI	Insurance and Finance
Pakistan Oil Ltd	POL	Cables and Electric Goods
Pakistan Tobacco Company	PAKT	Tobacco
Pakistan State Oil Company.	PSOC	Fuel and Energy
PTCL (A)	PTC	Fuel and Energy
Pakistan Hotel Development Ltd	PHDL	Miscellaneous
Pakistan Gum and Chemicals	PGUM	Chemicals and Pharmaceuticals
Paramount Spinning Milss Ltd	PSML	Textile Spinning
Pakistan Oil Fields Ltd	PKOF	Fuel and Energy
Pakistan Services Ltd	PKSL	Fuel and Energy
Pakistan Petroleum Ltd	PPL	Cables and Electric Goods
Singer Pakistan Ltd	SING	Cables and Electric Goods
ICP SEMF Modarba	SEMF	Modarba
Sitara Chemical	SITC	Chemicals and Pharmaceuticals
Shell Pakistan Ltd	SHELL	Fuel and Energy
Sakrand Sugar Mills Ltd	SKML	Sugar and Allied
Sui Southern Gas Company	SNGC	Fuel and Energy
Sui Northern Gas Company	SSGC	Fuel and Energy
Suzuki Motorcycle Pakistan	SUZUK	Auto and Allied
Unicap Modarba	UNIM	Modarba

Table A2: The Summary Statistics of the Data

	Mean	Std. Dev.	Skewness	Kurtosis	Observations
ABOT	0.001	0.022	-3.212	34.237	486
AGTL	0.0005	0.020	-2.025	24.931	486
AICL	0.003	0.028	-0.308	3.704	487
ASKB	0.001	0.030	-0.673	6.011	486
ASKL	-0.002	0.030	-0.264	4.592	486
AZAM	-0.003	0.072	-0.373	16.587	486
BATA	0.001	0.26	0.32	3.48	486
BOP	0.001	0.030	-2.423	16.992	486
BTML	-0.002	0.062	-0.54	10.286	486
CHCC	-0.001	0.028	-0.843	9.045	486
CPAP	-0.001	0.022	-1.131	11.116	486
DHCL	0.0002	0.025	-0.029	3.48	4.86
DSFL	-0.001	0.034	1.531	11.148	486
ELCOT	-0.002	0.017	-0.943	10.483	486
EMCO	-0.001	0.040	2.894	24.316	486
ENGRO	0.001	0.023	0.224	3.694	486
FFBQ	-0.0001	0.026	0.031	3.34	486
FFCL	-0.0001	0.031	0.180	3.176	486
FEROZ	-0.004	0.024	-3.761	4.064	486
GULT	-0.002	0.024	-0.420	6.666	486
HONDA	-0.001	0.035	-5.578	8.378	486
HUBC	-0.0002	0.018	0.045	6.343	486
ICI	0.001	0.026	-0.005	3.328	486
INDU	0.001	0.023	0.134	3.795	486

IPCL	-0.001	0.070	0.639	5.986	486
JPPG	-0.001	0.037	1.128	7.84	486
LEVER	0.001	0.014	-0.324	10.286	486
LUCK	0.004	0.025	-0.097	2.903	486
MCB	0.005	0.026	-0.736	5.993	486
METRO	0.001	0.043	0.072	2.914	486
MFTM	-0.002	0.041	0.289	3.613	486
MITCH	-0.001	0.020	0.167	5.968	486
MPLC	0.001	0.759	15.04	2.883	467
MSCL	0.001	0.043	0.072	3.407	470
MKSM	0.003	0.031	-0.008	3.407	486
NBP	0.004	0.027	-1.004	7.897	486
NML	0.002	0.025	-0.229	2.786	486
NATR	-0.0003	0.024	0.218	3.503	486
NESTLE	0.001	0.018	0.098	5.679	486
OGDC	0.002	0.022	-0.109	3.333	486
PKOF	0.003	0.030	-0.455	4.275	486
PICIC	-0.001	0.026	-2.435	19.171	486
PMI	0.000	0.044	1.339	8.508	486
POL	0.004	0.021	-0.017	3.721	486
PSO	0.000	0.019	-0.328	4.216	486
PTCL	-0.002	0.035	-6.454	7.007	486
PHDL	0.0002	0.020	-0.317	6.952	486
PGUM	0.0002	0.025	-1.159	12.007	486
PAKT	0.0003	0.025	0.199	3.212	486
PKSL	0.002	0.021	0.408	5.578	486
PPL	0.001	0.030	-0.035	2.768	486
SIEM	0.004	0.024	-0.025	3.538	486
SELP	-0.001	0.033	0.790	7.050	486
SHELL	0.000	0.023	-3.763	4.478	486
SITC	0.001	0.021	-0.543	9.775	486
SSGC	0.002	0.024	0.190	2.903	486
SNGP	0.0002	0.026	-0.014	3.58	486
SUZUK	0.001	0.035	0.078	2.821	486
UNIM	-0.002	0.118	0.254	13.022	486

Table A3: Evidence on Market Model-with-GARCH Specification

	β_0	β_m	α_i	ϕ_0	ϕ_1	λ_1	R^2
ABOT	-0.01	0.01*	-0.32*	0.01*	1.77*	0.07*	0.22
	(-3.08)	(2.19)	(-5.99)	(5.88)	(4.70)	(2.26)	
AGTL	0.50	0.04*	-0.04	0.12*	0.22*	0.82*	0.29
	(0.84)	(2.08)	(-0.87)	(3.34)	(5.99)	(34.89)	
AICL	0.11	0.56*	0.08*	0.01*	0.53*	-0.04*	0.29
	(0.61)	(6.71)	(2.15)	(4.01)	(4.05)	(-2.32)	
ASKB	-0.21	0.39*	0.01*	0.01	0.16*	0.67*	0.44
	(-0.39)	(3.79)	(2.06)	(1.37)	(2.09)	(3.72)	
ASKL	0.01	0.21*	-0.09**	0.01*	0.01*	0.86*	031
	(0.76)	(3.49)	(-1.89)	(2.27)	(3.88)	(7.66)	
AZAM	0.02	0.02*	-0.12*	0.01*	0.13*	0.15*	0.20
	(1.35)	(2.31)	(-2.04)	(5.50)	(3.43)	(1.72)	
BATA	0.30	0.02***	0.13*	0.02*	0.21*	0.47*	0.30
	(0.31)	(1.63)	(2.62)	(3.09)	(3.07)	(3.31)	
BOP	-0.14	0.78	-0.24*	0.01*	1.01*	0.24*	0.29
	(-0.91)	(13.48)	(-2.87)	(4.45)	(6.69)	(5.14)	
BTML	-0.12	0.31*	-0.08**	0.20*	0.07*	0.41**	0.27
	(-1.24)	(2.05)	(-1.83)	(2.76)	(2.11)	(1.91)	

CHCC	-0.13	0.09**	-0.03	0.03*	0.48*	0.23*	0.41
	(-1.49)	(1.72)	(-1.54)	(5.67)	(6.79)	(2.93)	
CPAP	-0.11	0.004**	0.09*	0.21	-0.02	0.52*	0.24
	(-0.86)	(1.98)	(2.53)	(0.74)	(-1.29)	(2.81)	
DHCL	-0.10	0.16**	-0.06**	0.11*	0.16*	0.61*	0.29
	(-0.18)	(2.50)	(-1.98)	(2.34)	(2.86)	(4.80)	
DSFL	0.001	0.17*	0.17*	0.001	0.01	0.95*	0.41
	(0.31)	(2.72)	(3.04)	(1.18)	(1.22)	(3.04)	
ELCOT	-0.22	0.02*	0.15*	0.11*	0.03*	0.91*	0.37
	(-2.16)	(2.49)	(3.21)	(4.03)	(4.25)	(48.77)	
EMCO	-0.33	0.11**	0.01***	0.08*	0.62*	-0.02*	0.22
	(-0.19)	(1.94)	(1.65)	(11.66)	(10.07)	(-6.56)	
ENGRO	0.13	0.11*	-0.06	0.21*	0.22*	0.67*	0.28
	(1.24)	(2.11)	(-1.22)	(2.99)	(3.73)	(8.65)	
FFBQ	0.40	0.09**	-0.03	0.13*	0.17*	0.71*	0.37
	(0.42)	(1.93)	(-0.05)	(2.23)	(3.08)	(7.69)	
FFCL	0.11	0.859*	0.12***	0.01*	1.72*	0.19*	0.32
	(-0.15)	(15.42)	(1.72)	(3.93)	(19.61)	(12.18)	
FEROZ	-0.12	0.03**	-0.10	0.12*	0.10*	0.12	0.23
	(0.08)	(1.84)	(-1.56)	(10.91)	(10.91)	(1.33)	
GULT	-0.31	0.15*	0.01**	0.30*	0.08*	0.86*	0.29
	(-2.85)	(3.09)	(1.92)	(3.19)	(3.58)	(26.23)	
HONDA	0.11	0.06*	0.22*	0.41*	0.36*	0.72*	0.40
	(0.52)	(2.89)	(3.85)	(2.66)	(4.74)	(13.66)	
HUBC	0.20	0.04*	-0.20	0.02*	0.08*	0.85*	0.32
	(0.03)	(2.14)	(-0.21)	(3.45)	(3.41)	(22.95)	
ICI	0.13	0.23*	-0.15*	0.001*	0.16*	0.79*	0.28
	(1.37)	(4.08)	(-2.45)	(2.42)	(3.14)	(13.09)	
INDU	0.22	0.34*	0.12	0.01	0.11*	0.74*	0.27
	(0.95)	(6.48)	(1.57)	(1.50)	(2.33)	(3.89)	
IPCL	-0.002	0.01*	-0.22*	0.001*	0.002*	0.97*	0.43
	(-0.72)	(2.07)	(-5.47)	(3.27)	(2.42)	(17.2)	
JPG	-0.14	0.02*	-0.09***	0.01*	0.97*	0.10*	0.56
	(-0.73)	(2.23)	(-1.64)	(3.36)	(8.87)	(2.09)	
LEVER	0.01	0.08*	-0.09*	3.92*	1.49*	-1.44*	0.41
	(3.14)	(2.15)	(-2.26)	(4.49)	(2.29)	(-2.63)	
LUCK	0.21	0.46*	0.12**	0.01	0.19*	0.80*	0.27
	(1.29)	(7.58)	(1.94)	(1.52)	(4.01)	(21.41)	
MCB	0.01	0.71*	-0.15**	0.01	0.11	0.29	0.28
	(2.55)	(10.91)	(-1.98)	(1.44)	(1.14)	(0.61)	
METRO	0.01	0.08*	0.20*	0.33	0.07**	0.75*	0.38
	(0.03)	(2.57)	(4.09)	(1.53)	(1.92)	(5.40)	
MTFM	-0.004	0.28*	-0.15*	0.12*	0.24*	0.16	0.026
	(-2.36)	(3.30)	(-3.27)	(3.69)	(3.11)	(0.82)	
MITCH	-0.21	0.09*	0.16*	0.11*	0.17*	0.52*	0.29
	(-0.89)	(2.00)	(2.84)	(4.36)	(4.52)	(5.71)	
MPLC	0.33	0.04*	0.35*	0.21*	0.88*	0.65*	0.57
	(0.37)	(2.51)	(6.90)	(3.62)	(13.79)	(46.96)	
MKSM	0.003	0.03**	0.27*	0.02***	0.11*	0.87*	0.65
	(1.99)	(1.97)	(6.11)	(1.87)	(3.62)	(24.82)	
MSCL	0.12	0.06*	0.20*	0.03	0.08**	0.75*	0.38
	(0.03)	(2.57)	(4.06)	(1.53)	(1.93)	(5.41)	
NATR	-0.11	0.12*	0.01*	0.11*	0.31*	0.56*	0.59
	(-1.03)	(2.03)	(2.17)	(3.50)	(3.89)	(6.39)	
NESTLE	0.50	0.02*	-0.06	0.07*	0.17*	0.61*	0.32
	(0.72)	(2.50)	(-1.14)	(5.28)	(4.55)	(9.73)	
NBP	0.22	0.93*	-0.22*	0.01**	0.10*	0.92*	0.33
	(1.92)	(15.23)	(-3.12)	(1.87)	(3.93)	(58.40)	

NML	0.01	0.91*	-0.05	0.01*	0.43*	0.46*	0.27
	(0.34)	(15.22)	(-1.61)	(3.23)	(3.82)	(4.44)	
OGDC	0.13	0.16	0.03	0.20	0.16	0.79	0.35
	(1.49)	(2.51)	(1.68)	(2.7)	(3.69)	(16.27)	
PAKT	-0.21	0.14*	-0.05	0.07*	0.15*	0.73*	0.26
	(-0.17)	(2.68)	(-0.93)	(2.49)	(2.97)	(8.85)	
PHDL	-0.50	0.10*	0.29*	0.42*	0.24*	0.70*	0.39
	(-0.05)	(2.38)	(4.77)	(8.28)	(5.85)	(24.41)	
PICIC	-0.30	0.46*	-0.19	0.01*	0.30*	0.02	0.28
	(-1.83)	(6.90)	(-1.59)	(6.92)	(4.02)	(0.18)	
PMI	-0.23	0.70*	-0.29*	0.01*	0.09*	0.87*	0.31
	(-1.24)	(9.00)	(-4.07)	(2.27)	(2.91)	(23.63)	
POL	0.003	0.75*	-0.14***	0.01*	0.26*	0.69*	0.23
	(2.88)	(14.36)	(-1.75)	(2.57)	(2.94)	(8.75)	
PSO	-0.12	0.14*	-0.41	0.02*	0.19*	0.77*	0.25
	(-0.30)	(2.78)	(-0.72)	(2.58)	(3.99)	(15.50)	
PTCL	-0.22	0.88*	-0.03*	0.01*	0.35*	0.49*	0.33
	(-1.99)	(13.47)	(-2.55)	(3.42)	(3.62)	(5.58)	
PPL	0.11	0.24*	0.30	0.23**	0.15*	0.81*	0.35
	(0.97)	(3.29)	(1.69)	(1.89)	(3.12)	(13.52)	
PGUM	-0.40	0.04*	0.07	0.31*	0.04*	0.91*	0.41
	(-0.36)	(2.60)	(1.39)	(2.16)	(2.93)	(27.99)	
PKSL	0.20	0.41*	0.07	0.21*	0.19*	0.76*	21
	(0.34)	(2.11)	(1.37)	(9.05)	(7.16)	(43.32)	
SIEM	0.23	0.09**	0.06	0.01*	0.08*	0.88*	0.32
	(1.31)	(1.89)	(0.85)	(2.32)	(2.35)	(16.2)	
SEPL	-0.11	0.60**	-0.09	0.12*	0.10*	0.83*	0.28
	(=0.79)	(1.87)	(-1.65)	(3.09)	(3.65)	(19.51)	
SHELL	0.13	0.28**	0.01*	0.02*	-0.01*	1.00*	0.42
	(0.84)	(5.50)	(2.16)	(2.67)	(-24.09)	(17.86)	
SITC	-0.11	0.11**	-0.04	0.20*	0.16*	0.43**	0.39
	(-0.65)	(1.79)	(-0.50)	(2.24)	(2.41)	(1.96)	
SELP	-0.12	0.06*	-0.09***	0.11*	0.09*	0.83*	0.21
	(-0.79)	(2.87)	(1.65)	(3.09)	(3.65)	(19.51)	
SKML	0.31	0.35*	-0.22*	0.22*	0.14*	0.37*	0.35
	(-1.31)	(2.66)	(-3.76)	(3.64)	(3.47)	(2.36)	
SSGC	-0.23	0.15*	0.07*	0.11	0.18*	0.82*	0.27
	(-0.29)	(2.09)	(2.17)	(1.43)	(5.11)	(26.91)	
SSNG	-0.11	0.14**	-0.03	0.40*	0.18*	0.75*	0.25
	(-0.16)	(1.97)	(-0.42)	(2.75)	(4.08)	(14.99)	
SUZUB	-0.33	0.18*	0.04***	0.003*	0.13*	0.63*	0.33
	(-1.63)	(2.17)	(0.72)	(2.04)	(2.31)	(4.04)	
UNIM	-0.20	0.09*	0.59*	0.21*	0.10*	0.76*	0.37
	(-2.16)	(2.36)	(8.45)	(3.26)	(3.99)	(12.61)	

Note: The values in the parenthesis give the t-values, * represents significant at 1%, ** significant at 5% and *** significant at 10 % respectively.