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Asset Pricing Behaviour with Dual-Beta in Case of Pakistani Stock Market

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This study investigates the dynamics of beta by the asymmetric response of beta to bullish and bearish market environment on 50 stocks traded in Karachi Stock Exchange during 1993-2007. The results show that the betas increase (decrease) when the market is bullish (bearish). The results however suggest that investors receive a positive premium for accepting down-side risk, while a negative premium is associated with up-market beta. The results suggest that the conditional Fama and French three factor model has performed better than the conditional CAPM when news asymmetry was taken into account compared with the unconditional Fama and French three factor model and the unconditional dual-beta CAPM in explaining the relationship in beta and returns in case of Pakistani market.

JEL classification: G12, G15
Keywords: Beta Instability, High Market Beta, Low Market Beta, EGARCH Model, News Asymmetry, Fama and French Three Factor Model

1. INTRODUCTION

In the realm of asset pricing models the Sharpe (1964) and Lintner (1965) Capital Asset Pricing Model (CAPM) continues to be the primary and dominant model. However, after the introduction of CAPM academics have presented many critiques invalidating its statistical significance [Fama and French (1993) and numerous other studies]. They have consistently held that the CAPM's single factor (beta) defined as covariance of asset returns with market return was unable to capture all risks associated with the explanation of an assets expected returns. On the one hand, it leads to the development of a two-beta model that incorporates the up and down market responses of stock returns which allows the separation of systematic risk into favourable and unfavourable variations respectively from up-side and down-side responses[Kim and Zumwait (1979)]; on the other hand, the characteristics of the firms that are likely to explain the anomalies in asset returns need to be specified such as small firm effect, January effect, earning-to-price ratio, book to market value and leverage. The most prominent work in this regard is the series of papers by Fama and French (1993, 1995,

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1996, 1998 and 2004),[1] which construct hedge portfolios with long/short positions in firms with attributes that are known to be associated with mean returns. The three-factor model of Fama and French (1996) says that the expected returns in excess of risk free rate are explained by the excess market return, the difference between the returns on portfolio of small stocks and returns on portfolio of large stocks and the difference between the returns on portfolio of high book-to-market stocks and returns on a portfolio of low book-to-market stocks. The three-factor model of Fama and French (1993) is now widely used in empirical research that requires a model of expected returns. Among practitioners, the model is offered as an alternative to the CAPM for estimating the cost of equity capital (for example, Ibbotson Associates), and portfolio performance [Fama and French (2004)].

Since the Fama and French (1992) study, several studies have argued that it might be too early to reject beta as systematic measure of risk [Clare, Priestley, and Thomas (1998); Kathori, Shanken, and Salon (1995); Davis and Desai (1998) and Faff (2001)]. The empirical evidence shows that the downside risk may be a more appropriate measure of portfolio risk than the conventional single beta [Grundy and Malkiel (1996) and Kim and Zumwalt (1979)]. One view is that the inadequacy of the single factor CAPM is due to non-stability or randomness of betas. Fabozzi and Francis (1977) document the results to determine that the regression coefficient of standard CAPM are significantly different in bull and bear markets. Levy (1974) allows the beta to change with good news and bad news in the model, while Black (1993) estimates the regression model in which intercept term varies overtime. Another view is that the time variability is due to the time varying nature of beta, therefore, testing CAPM in various market conditions with constant risk parameters is over-simplified because the returns distribution is time varying in nature.[2] This stylised fact is first examined in the time varying behaviour of conditional covariances by Engle, Lillen, and Robins (1987), Bollerslev, Engle, and Wooldridge (1988), and Bollerslev, Engle, and Nelson (1994). Some studies investigate the effect of good and bad news measured by positive and a negative return i.e., the leverages effects, on beta of CAPM [Braun, Nelson, and Sunier (1995); Chou and Engle (1999) and Granger and Silvapulle (2002)]. Pagan and Sussounov (2000) show that the nature of bull and bear market depends on the type of data generating process which generates capital gains in the market.[3] Granger and Silvapulle (1999) use value-at-risk to define various market conditions. Maheu and McCurdy (2000) use duration dependence as a source of non-linearity in the stock market cycles.[4]

[1]There are several arguments on the firm specific attributes that are used to form Fama and French factors. Haugen and Baker (1996), Daniel and Titman (1997) are of the view that such variables may be used to find assets that are systematically mispriced by the market. Others argue that these measures are proxies for exposure to underlying economic risk factors that are rationally priced in the market [Fama and French (1993, 1995 and 1996)]. Another view is that the observed predictive relation are largely the result of data snooping and various biases in the data [MacKinley (1995), Black (1993), Kothari, Shanken, and Sloan (1995)].

[2]Harvay (1995) for emerging markets, Iqbal and Brooks (2007) and Javid and Ahmad (2008) for Pakistani market.

[3]Pagan and Sussounov (2000) argue that the macroeconomics is able to interpret some of the observed characteristics of data which are based on some economic behaviour. For example it may be that the volatility seen in equity prices stem from volatility in the making of monetary policy and hence might disappear as monetary policy regime changes.

[4]They argue that possible explanation of persistence of bull is that investors become more optimistic about the future and hence wish to invest more in the stock market. This positive feedback means that the probability of switching out of the bull market decreases with duration.

The purpose of the present study is to look in to the failure of beta to explain the cross-section variation in expected returns for Pakistani market and to investigate the hypothesis that stock returns respond differently to up and down markets. The model allows total systematic risk to be separated into variation due to upside response which is considered as good news and variation due to down side response which is viewed as bad news.[5] In the next stage, the dual-beta CAPM model is extended by including Fama and French (1993) size and book to market value as risk factors. Thereafter, dual-beta CAPM and Fama and French three factor models are extended by incorporating conditional information by allowing variance equation to capture news asymmetry. The final issue investigated is the risk premium for market risk in the bull and bear market conditions in conditional and unconditional settings. The dual-beta CAPM and Fama and French three factor models have not been tested for Pakistan. The current study contributes to existing literature firstly by testing the static and dynamic dual-beta CAPM and Fama and French three factor models on individual stocks' daily and monthly data. Secondly, different time intervals are investigated as the market has different sentiments at different periods.

The study is organised as follows. The previous empirical findings are briefly reviewed in Section two. Section three outlines the empirical methodology. The results are presented in Section four, followed by a concluding section.

2. REVIEW OF PREVIOUS EMPIRICAL FINDINGS

The standard CAPM has been extensively tested by many studies and evidence shows that there is no significant relationship between average returns and market beta. That beta does not sufficiently explain the variation in expected return is strongly presented in the study by Fama and French (1992) and (1993). Further this finding is confirmed by Grinold (1993), Davis (1994), He and Ng (1994), Fama and French (1995), (1996) , (1998) and (2004) and Javid and Ahmad (2008) in addition to numerous other studies. On the other hand there is considerable counter evidence that supports beta to explain risk return relationship such as Black (1993), Bhardwaj and Brooks (1993), Harris and Marston (1994), Pettengill, Sundaram, and Muthar (1995), Kothari, *et al.* (1995) and Clare, *et al.* (1998).

Fabbozi and Francis (1978) and Levy (1974) extend CAPM by computing separate betas for bull and bear markets to test for the instability of beta and the validity of the return-beta relationship. Following Levy (1974) several studies test for randomness of beta. Fabozzi and Francis (1977) estimate and test the stability of betas over the bull and bear markets but they find no evidence supporting beta instability. Chen (1982) allows beta to be non-stationary in up and down markets and conclude that under the condition of either constant or changing beta, investors get premium for downside risk. Braun, *et al.* (1995) and Chou and Engle (1999) investigate the effect of good and bad news called leverage effects, as measured by positive and negative returns on beta. Braun, *et al.* (1995) examine the variability of beta using exponential GARCH models allowing

[5]There is positive relationship between beta and return in up market and a negative one in the down market, so the beta-return relationship is not shown up in aggregate. It is possible that the positive beta-return relationship in bull markets offsets the negative beta return relationship in the bear market. Therefore unless the positive beta relationship in bull market is stronger than negative beta-return in bear market, the overall long run relationship between return and beta would not be positive.

market volatility, portfolio-specific volatility and beta to respond asymmetrically to positive and negative market and portfolio returns using monthly data, however they do not uncover this relationship. Chou and Engle (1999), on the other hand, use a two-beta model with an EGARCH variance specification and daily stock returns of individual firms and conclude that news asymmetrically affects the betas. Woodward and Anderson (2001) find different betas for bull and bear conditions using the Australian industry portfolios. Faff (2001) apply multivariate one-step procedure to investigate CAPM in bull and bear market conditions and find that there is minimal evidence of a difference between up-market and down-market industry beta. However, when the excess market return is negative (positive) he finds strong evidence of a negative (positive) relationship between beta and return.

An alternative approach to capture market movements is through various market volatility regimes. Galagedera and Faff (2003) examine the validity of a conditional three-beta model in the low, flat and high volatility regimes and find most of the asset portfolio betas not significantly different in the three regimes. The Markov regime switching model is used by Huang (2000) to investigate the instability of beta and concludes that CAPM is stable in the low risk state and not stable in the high risk state.

While investigating whether the variation in the stock returns volatility is different in expansionary and in contractionary phases of business cycles, Schwert (1989), Hamilton and Lin (1996) and McQueen and Thorley (1993) show that conditional volatility in stock returns exists which is counter-cyclical, and this behaviour is more pronounced in the recession than in the expansion phases of the business cycle. Some studies investigate the conditional CAPM and conclude that the fluctuations and events that affect the market might change the leverage of the firm and the variance of stock return and change the beta. Bhaduri and Durai (2006) explore the stability of beta for India for individual stocks and strongly validate that betas are stable in all market conditions.

The poor empirical response of standard CAPM due to a number of seemingly unexplained patterns in asset returns has resulted in using sorted portfolios of stocks to represent the factors in a multifactor model. The lack of any generally acceptable explanation and acceptance and persistence of these patterns are the main reasons why they are described as anomalies. Some of such puzzling anomalies are the small firm effect, January effect, earning-to-price ratio, book to market value and leverage etc. The most influential work in this regard is the three-factor model of Fama and French (1993, 1995, 1996, 1997, 1998 and 2004), which adds two variables besides the market return, namely the returns on SMB and the returns on HML stock. Fama and French (1993) show that there is virtually no cross-sectional beta mean returns relationship. They show that variation on average returns of 25 size and book/market sorted portfolio can be explained by betas on the latter two factors. Fama and French explain the real macroeconomic aggregates as non-diversifiable risks that are provided by the returns of HML and SMB portfolios. In a later study, Fama and French (1996) extend their analysis and find that HML and SMB portfolios comfortably explain strategies based on alternative price multiplier strategies based on five-year sale growth and the tendency of five-year returns to reverse. All these strategies are not explained by CAPM betas. Fama and French (1996) conclude that many of the CAPM average returns anomalies are related and can be captured by their three-factor model. However Chang, Johnson, and Schill (2001) have observed that as higher-order systematic co-moments are included in the cross-sectional regressions for portfolio returns, the SMB and HML generally become insignificant. Therefore, they argue that SMB and HML are good proxies for higher-order co-moments. Ferson and Harvey (1999) claim that many multifactor model specifications are rejected because they ignore conditioning information. They have shown that identified predetermined conditional variables have significant explanatory power for cross-sectional variation in portfolio returns. They reject the three factor model advocated by Fama and French (1993). They come to the conclusion that these loadings are important over and above the three factors of Fama and French and also the four factors of Elton, Gruber, and Blake (1995).

This study investigates the risk return relationship under different market conditions for the Pakistani equity market. It is believed that testing the dual-beta CAPM and dual-beta Fama and French three-factor models in unconditional and conditional context would yield some interesting results for the Pakistani equity market.

3. EMPIRICAL METHODOLOGY AND DATA

The analysis begins by estimating the model developed by Sharpe (1964) and Lintner (1965) in which a relationship for expected return is written as:

$$r_t = \alpha + \beta_{rm} r_{mt} + \varepsilon_t \qquad \varepsilon_t \sim (0, h_t) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where r_t is the excess return on asset i and r_{mt} is the excess return on market portfolio over the risk-free rate. The α_i and β_{rm} are regression coefficients and β_{rm} is the measure of risk or market sensitivity parameter defined $\beta_{rm} = \text{cov}(r_t, r_{mt}) / \text{var}(r_{mt})$. The market beta is the slope coefficient of time series regression of asset return on market portfolio given in the above Equation (1) and it is used as explanatory variable in the following cross-section regression equation estimated by the Generalised Least Square (GLS):

$$r_t = \lambda_0 + \lambda_{rm} \beta_{rm} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

The coefficient λ_1 is the premium associated with beta risk and an intercept term λ_0 has been added in the equation. If $\lambda_0 = 0$ and, $\lambda_{rm} > 0$ this implies that Sharpe-Lintner CAPM holds.

The poor empirical response of standard CAPM [Javid and Ahmad (2008) and Iqbal and Brooks (2007)] motivated to extend the standard CAPM by incorporating Fama and French (1993) three-factor model, in order to examine whether size and book to market value can explain the portion of expected returns, which cannot be explained by CAPM.[6] Fama and French (1993) have incorporated two more risk factors: the difference between the expected return on portfolios of stocks of small and larger firms (SMB) and difference between the expected return on portfolios of stocks that exhibit high and low

[6]The ratios involving stock prices have information about expected return missed by the betas. This is because stock's price depends not only on expected cash flows but also on the expected return that discount on expected cash flow back to the present. Thus a high expected return implies a high discount rate and a low price. These ratios thus are prime candidates to expose shortcomings of CAPM [Basu (1977)]. The earning-price ratio, debt-equity, and book-to-market ratios play their role in explaining expected return.

book to market value HML. Book to market value and firm size are risk proxies which means that a firm with a high book to market equity ratio (a relatively low market equity value) is likely to be a distressed firm and such firms have sustained losses recently and consequently have a substantial risk of bankruptcy (may have high leverage as well). Likewise, a small firm has more chances of failure than a large firm. The two step procedure is followed to estimate Fama and French three-factor model. The following time series regression model is estimated in the first stage:

$$r_t = \alpha + \beta_{rm} r_{mt} + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

The risk premium associated with these risk factors are estimated by cross-section regression Equation (3) that is estimated by GLS,

$$r_t = \lambda_0 + \lambda_{rm}\beta_{rm} + \lambda_{SMB}\beta_{SMB} + \lambda_{HML}\beta_{HML} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

Where SMB (Small minus Big) represents the risk factor diverge of the rate of returns with size effect; the HML (High minus Low) represents the risk factor of return rate with ratio book to market value effect. The βs measure the sensitivity of each asset associated to these variables. The λs are GLS coefficient which indicate the extent to which the cross-section of asset returns can be explained by these variables each year.

In this study the SMB portfolio is sorted by market value or size following Fama and French (1996), and the mean market equity is calculated which is the cutting point. All stocks are divided into two parts; companies having market value of more than cutting point are big company stocks (B) while companies having market value of less than cutting point are small company stocks (S). It is believed that high and low market conditions have asymmetric effect on beta. In addition to bringing the book to market value the ratio of stocks is divided into three groups according to book to market sorting: the first group with 30 percent of whole stocks has the highest book to market ratio called high group (H), the second group with 40 percent of whole stocks has medium book to market ratio called medium group (M) and the last group with 30 percent of whole stocks has the lowest book to market ratio called low group (L). In the next step, stocks are organised into six groups according to the cross of stocks group in the first and second step as S/L, S/M, S/H, B/L, B/M, B/H. The weight average monthly returns of each group is calculated equally according to the method of Fama and French (1996).[7]

The standard CAPM is extended by incorporating two betas, one for high market and the other for low market conditions and thereafter it is modified with Fama and French (1993) size and book to market risk factors. Following Fabozzi and Francis (1977) the positive market return is defined as up (bull) market while negative market return is defined as down

[7]SMB (Small minus Big) represent the risk factor diverge of rate return which involve with size effect, SMB will different in each month among average return rate of small sample group (S/L, S/M and S/H) with the average return rate of 3 large groups (B/L, B/M, B/H).

SMB = Small minus Big = Average Returns of Small Size minus Big Size
= 1/3 (S/H + S/M + S/L) – 1/3 (B/H + B/M + B/L)

HML (High minus Low) represent the risk factor of return rate that involve with ratio book to market value (BE/ME) effect. HML each month has differ between average return rate of two portfolios that has BE/ME high (S/H and B/H) with average return rate of two portfolios has BE/ME low (S/L and B/L)

HML = High Minus Low = Average Returns of High BE/ME minus Low BE/ME ratio
= 1/2 (S/H + B/H) – 1/2 (S/L + B/L)

(bear) market. To capture the asymmetric effects of various market conditions on beta, two betas are estimated for each stock corresponding to bear and bull market conditions by introducing two dummy variables D_H and D_L in the models (1) and (3). Dummy variable D_H is defined as 1 if market return is greater than zero and 0 otherwise and D_L is defined as1 if market return is negative and zero otherwise. In order to examine the beta coefficient in the bull and bear market conditions the Equation (1) is modified as:

$$r_t = \alpha + \beta_H D_H r_{mt} + \beta_L D_L r_{mt} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Equation (5) gives the dual-version of the standard model, where two betas β_H and β_L are estimated for each stock corresponding to positive and negative market conditions. The asymmetric effects of various market conditions on beta is investigated by estimating two betas for each stock corresponding to bear and bull market conditions and to test the equality of the up and down market betas on pair-wise basis by applying the Wald test. The cross sectional beta-return relationship using these two sets of beta estimates is as follows:

$$r_t = \lambda_0 + \lambda_H \beta_H + \lambda_L \beta_L + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

$$r_t = \lambda_0 + \lambda_H \beta_H + \lambda_L \beta_L + \lambda_{SMB} \beta_{SMB} + \lambda_{HML} \beta_{HML} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

The $\lambda_L$and λ_H are risk premium corresponding to bull and bear market conditions. According to Kim and Zunwait (1979) and others as $\lambda_L>0$ an investor would like to receive a positive premium for accepting downside risk and as $\lambda_H<0$ an investor is willing to pay a positive premium in the up market. The equality of these pricing parameters is tested by applying the Wald test. The λ_{SMB} and λ_{HML} are risk premium for size and book to market value risks respectively.

In models (3) and (4) is a dual-beta CAPM and Fama and French three-factor model in which the asymmetric effect on expected return is captured in unconditional context. It has been argued in the empirical literature that as beta depends on good news and bad news defined as negative and positive returns respectively, the volatility is also affected by news asymmetry [Braun, *et al.*(1995)]. Nelson (1991) points out that the changes in stock returns' volatility have negative correlation with returns themselves. As a result, volatility increases in response to bad news and falls in response to good news.[8] To capture the asymmetric effect on conditional variance, the exponential GARCH model suggested by Nelson (1991) is used. The main advantage of this model is that the parameters are not restricted to be non-negative. The following Equations (8) and (9) allow the asymmetric effect of various market conditions on volatility of stock returns in conditional CAPM-with EGARCH(1,1) model:

[8]The asymmetry between positive and negative shocks can be explained as follows. An unexpected decline in prices causes volatility, thereby increasing the expected volatility in future. Since the increase in the volatility has to be compensated by an increase in risk premium, the expected rate of return must rise. Therefore the unexpected shock result in decline in the current stock price, and hence further reinforce the initial negative shock and increase the level of current and future volatility. In case of positive price shock the initial impact is the same however, the decrease in stock price tend to offset the impact of positive shock. Therefore the initial increase in level of current and future volatility is partially offset. At firm level the asymmetry between the effects of good and bad news on the level of volatility can be explained through the leverage effect [Bakaert and Wu (1997)].

$$r_t = \alpha + \beta_{rm} r_{mt} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

$$\log(h_t) = \gamma_0 + \delta \log h_{t-1} + \mu \left| \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right| + \gamma_1 \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

The extended Equations (10), (11) and (12) are estimated to capture the asymmetric effect of high and low market conditions on mean and volatility of stock returns in dual-beta CAPM-with-EGARCH(1,1) model and dual-beta Fama and French-with-EGARCH (1,1) model:

$$r_t = \alpha + \beta_H D_H r_{mt} + \beta_L D_L r_{mt} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (10)$$

$$r_t = \alpha + \beta_H D_H r_{mt} + \beta_L D_L r_{mt} + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \varepsilon_t \quad \ldots \quad \ldots \quad (11)$$

$$\log(h_t) = \gamma_0 + \delta \log h_{t-1} + \mu \left| \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right| + \gamma_1 \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \theta_{Ht-1} D_{Ht-1} r_{mt-1}^2 + \theta_{Lt-1} D_{Lt-1} r_{mt-1}^2 \quad (12)$$

The conditional variance on the left hand side of Equations (9) and (12) are in log form implying that the forecasts of conditional variance are always positive. The news impact is asymmetric if $\gamma_i \neq 0$ for at least one i in Equations (9) and (12). Furthermore, if $\gamma_i < 0$ it implies that the leverage effect is present. To examine if betas of CAPM and Fama and French model respond differently in two market conditions, the equality of high and low market beta is tested in Equations (10) and (11), the equality of θ_L and θ_H in volatility Equation (12) is tested by the Wald test.

The risk premium for conditional CAPM-with-EGARCH(1,1) is estimated by the cross section Equation (2) and extended cross-section regression Equations (6) and (7) that estimate the risk premium for conditional dual-beta CAPM and Fama and French-with-EGARCH(1,1).

Data and Sample

The econometric analysis to be performed in the study is based on the data of 50 firms listed on the Karachi Stock Market (KSE), the main equity market in the country for the period January 1993 to December 2007. These 50 firms contributed 90 percent to the total turnover of KSE in the year 2000.[9] In selecting the firms three criteria were used: (1) companies have continuous listing on exchange for the entire period of analysis; (2) almost all the important sectors are covered in data, and (3) companies have high average turnover over the period of analysis.

From 1993 to 2000, the daily data on closing price turnover and KSE 100 index are collected from the Ready Board Quotations issued by KSE at the end of each trading day, which are also available in the files of Security and Exchange Commission of Pakistan (SECP). For the period 2000 to 2007 the data are taken from KSE website. Information on dividends, right issues and the bonus share book value of stocks are obtained from the annual report of companies. Using this information,

[9]Appendix Table A1 provides the list of companies included in the sample.

daily stock returns for each stock are calculated.[10] The six months' treasury-bill rate is used as risk free rate and KSE 100 Index as the rate on market portfolio. The data on six-month treasury-bill rates are taken from *Monthly Bulletin* of State Bank of Pakistan. The test of CAPM and Fama French three-factor models is carried out on individual stocks.

4. EMPIRICAL RESULTS

The empirical validity of unconditional and conditional dual-beta CAPM is examined by using daily as well as monthly data of 50 individual stocks traded at Karachi Stock Exchange during the period 1993 to 2007. The extended dual-beta CAPM with Fama and French three-factor model (1993) are tested in unconditional and conditional context using monthly data. The tests of these models are carried out in the excess return form and the risk factor in excess market return above the treasury-bill rate. The sample period is divided into sub-periods of three years: 1993-1995, 1996-1998, 1999-2001, 2002-2004 and 2005-2007; two large sub periods: 1993-2000 and 2001-2007; and for the whole sample period 1993-2007.[11]

First, it is established how well the extended version of CAPM with dual beta (one beta for the bull market and one for the bear market) explains the cross-section variation in the expected returns, which is tested by using daily as well as monthly data of 50 individual stocks. The dual version of CAPM is extended by including Fama and French (1993) size and book to market variables to examine whether these variables can explain the portion of expected returns, which cannot be explained by CAPM. The two-step procedure proposed by Fama and McBeth (1973) is followed, the betas or sensitivity of asset returns to market returns (high beta and low market betas) and firm characteristic variables (size, and book-to-market value), which capture anomalies are estimated in the first stage using Generalised Method of Moment approach (GMM) and the lagged market return and lagged asset returns are used as instruments. In the second step, a cross section regression of actual returns on betas is estimated for each month in the test period by applying the Generalised Least Square (GLS). The standard deviations of residuals from the beta estimation equation are used for the estimation of error covariance matrix involved in the GLS estimation procedure.[12] Finally, the parameter estimates are obtained for all the months in the test periods by taking the average of the premium for the test period. The mean risk premium so obtained is used to test, applying t-statistics, the null hypothesis that the risk premium is equal to zero. Since betas are generated in the first stage and then used as explanatory variables in the second stage, the regressions involve error-in-variables problem. Therefore the t-ratio for testing the hypothesis

[10] $R_t = \ln P'_t - \ln P'_{t-1}$, where R_t is stock return and P'_t, the stock price is adjusted for capital changes that is dividend, bonus shares and rights issued.

[11] In financial economics it is common practice to test the models for different sub periods to check the robustness of the results.

[12] For the empirical analysis of individual stocks GMM is used for time series estimation technique due to non-synchronous returns. Instrument variable is considered as a better choice [Scholes and William (1977)]. The cross-section regression has problem because the returns are correlated and heteroskedastic, therefore *GLS* is used in cross-section regression.

that average premium is zero is calculated using the standard deviation of the time series of estimated risk premium which captures the month by month variation following Fama and McBeth (1973). The alternative t-ratios are also calculated using a correction for errors in beta suggested by Shanken (1992).[13] The R^2 is average of month by month coefficient of determination.

In the first stage the sensitivity of the asset returns to market return in high and low market conditions is estimated using the daily data and monthly data in excess return form over risk free rate for the period 1993 to 2007. In the second stage the risk premium is estimated using high and low betas estimates from the first stage. The results from the first stage, presented in Appendix Table A3, show for almost all cases that bull and bear market betas are significantly different as shown by the Wald test. However, for 33 stocks, beta estimates are higher for positive market return than for negative market return, while for other 16 stocks the reverse is true based on monthly data. Including the Fama and French variables for 21 stocks, the greater beta estimate is obtained for positive market while for the rest the opposite is found to be true. These results are in accordance with the widely held view that the stock beta is higher in the bull market than in the bear market. It is also evident that the hypothesis of pair-wise equality of up-and-down market betas is rejected. These results confirm the other findings in the literature. Kim and Zunwait (1979), Davis and Desai (1998), Faff (2001) Granger and Silvapulle (2002) find that in bull market, higher beta stocks provide higher return than do the lower beta stocks.

Table 1 presents the results of dual-beta CAPM based on daily and monthly data. The results indicate that the risk premium for high market conditions has the correct sign, negative in all sub-periods, but it is significantly different from zero in the sub-period 2002-2004, 2005-2007, 2001-2007 and for the overall period 1993-2007. For low market conditions, the risk premium is positive but significant in 1993-1995, 2002-2004, 2005-2007 and 1993-2007. In the other sub period the risk premium corresponding to up market is negative and for down market it is positive but not significantly different from zero. The theoretical proposition is supported by these empirical findings in some sub-periods that the risk premium is positive in the down market and negative in the up market respectively. The hypothesis of pair-wise equality of risk premium in bull and bear market is rejected. The positive beta-return relationship in bear market is consistent with other findings [Chan and Lakonishok (1993); Davis and Desai (1998); Faff (2001); Granger and Silvapulle (2002)] which conclude that in bear markets high beta stocks fare worse than do the low beta stocks.[14]

[13]Shanken (1992) suggests multiplying $\hat{\sigma}^2(\hat{\lambda}_{it})^2$ by the adjustment factor $[1+(\mu_m-\hat{\lambda}_{it})^2]/\sigma_m^2$, where μ_m is mean of market return and σ_m is standard deviation of market return.

[14]Davis and Desai (1998) report the difference in average return between the lowest beta portfolio and highest beta portfolio is 11.28 percent, and beta-return is monotonic and positive. They find that difference in average return between the lowest beta portfolio and highest beta portfolio is –14.03 percent and beta return relationship is again monotonic, but negative. Grundy and Malkiel (1996) find similar results in their study for bear markets and argue that beta can still be used as measure of down-market risk.

Table 1

Average Risk Premium for Unconditional CAPM with High /Low Market

	Daily Data				Monthly Data			
	λ_H	λ_L	H_0: $\lambda_H=\lambda_L$	R^2	λ_H	λ_{0L}	H_0: $\lambda_H=\lambda_L$	R^2
1993-95	0.11	0.04	0.31*	0.31	0.01	0.03**	0.32*	0.32
	(0.32)	(1.84)			(–2.10)	(1.82)		
1996-98	–0.12	0.10	0.47*	0.47	0.02**	0.01**	0.21*	0.38
	(–0.67)	(0.24)			(2.24)	(0.37)		
1999-01	–0.01	0.02**	0.77**	0.77	–0.01	0.01	0.17**	0.36
	(–0.49)	(2-06)			(0.94)	(0.30)		
2002-04	–0.03*	0.03**	0.26*	0.36	–0.01**	0.01**	0.48*	0.38
	(–2.43)	(1.84)			(–1.86)	(1.94)		
2005-07	–0.11*	0.11	0.65***	0.65	–0.01	0.01	0.10***	0.39
	(–2.75)	(0.92)			(–3.04)	(0.87)		
1993-00	–0.01	0.01**	0.53**	0.53	–0.01	0.01	0.20**	0.38
	(–0.97)	(1.89)			(–0.57)	(0.78)		
2001-07	–0.01**	0.04	0.50*	0.50	–0.11**	0.05**	0.87*	0.40
	(–1.87)	(1.11)			(–1.88)	(1.87)		
1993-07	–0.12**	0.04**	0.57*	0.57	–0.12**	0.11**	0.89*	0.41
	(–1.87)	(1.83)			(–1.87)	(1.89)		

Note: The t-values reported in the parenthesis is error adjusted Shanken t-values. *Shows significant at 1 percent, ** is significant at 5 percent and *** is significant at 10 percent level.

With the addition of Fama and French (1993) size and book to market portfolios in the cross-section equation with high and low market betas, the premium for market beta for bull remain almost the same. However, for the bear market the risk premium becomes positive and significant for all sub-periods and the overall sample period. The premium of size of the firm is positive and significant except for period 1993-95. The book to market value remains insignificant for only two sub-periods 2005-2007 and 1993-2000 while in the rest of the periods the premium for book-to-market value is positive and significant. This suggests that the risk factors associated with high and low market returns, size and style of the firm are significantly rewarded in the market. The intercept terms are significantly different from zero. These results are consistent with other findings in literature, such as the one for the UK market by Clare, Priestly, and Thomas (1998) and for Pakistan by Iqbal and Brooks (2007).

Table 2

Average Risk Premium for Unconditional Fama French Model with High /Low Market

	λ_0	λ_H	λ_L	H_0: λ_H=λ_L	λ_{SMB}	λ_{HMLL}	R^2
1993-95	–0.33	–0.11	0.13**	0.27*	0.34	0.15**	0.38
	(–0.88)	(–1.13)	(1.89)		(0.88)	(0.46)	
1996-98	–0.12	–0.15	0.21**	0.43*	0.31**	0.16**	0.39
	(–0.67)	(–0.67)	(1.88)		(2.24)	(0.37)	
1999-01	–0.01	–0.12	0.12**	0.65**	0.42	0.15	0.40
	(–0.49)	(–0.88)	(1–97)		(0.94)	(0.30)	
2002-04	–0.11	–0.11*	0.12**	0.31*	0.31**	0.23**	0.38
	(–1.43)	(–2.01)	(1.89)		(1.86)	(1.94)	
2005-07	0.03	–0.22*	0.13**	0.57***	0.27	0.19	0.39
	(–2.75)	(–2.01)	(1.95)		(–3.04)	(0.87)	
1993-00	–0.01	–0.21**	0.17**	0.50**	0.31	0.15	0.39
	(–0.97)	(–1.97)	(1.89)		(–0.57)	(0.78)	
2001-07	–0.01**	–0.22**	0.14**	0.46*	0.29**	0.17**	0.41
	(–0.68)	(–1.85)	(1.93)		(1.88)	(1.85)	
1993-07	–0.02**	–0.12 *	0.13*	0.51*	0.30**	0.21**	0.42
	(–0.98)	(–2.08)	(2.06)		(1.87)	(1.89)	

Note: The t-values reported in the parenthesis is error adjusted Shanken t-values. *Shows significant at 1 percent, ** is significant at 5 percent and *** is significant at 10 percent level.

The conditional version of dual beta CAPM with EGARCH specification is tested and the results are presented in Table 3. The betas acquired from dual beta CAPM-with-EGARCH model are used to test the conditional relationship between beta and returns and the results of time series betas based on monthly data estimates are reported in Appendix Table A4. The results indicate a positive and significant relation between stock returns and market returns as shown by market β.

Table 3

Average Risk Premium for Conditional CAPM with High /Low Market

	Daily Data				Monthly Data			
	λ_H	λ_L	H_0: λ_H=λ_L	R^2	λ_H	λ_{0L}	H_0: λ_H=λ_L	R^2
1993-95	0.11	0.04	0.31*	0.31	–0.01	0.03**	0.32*	0.39
	(0.32)	(1.84)			(–2.10)	(1.82)		
1996-98	–0.12	0.10	0.47*	0.47	–0.02**	0.01**	0.21*	0.38
	(–0.67)	(0.24)			(–2.24)	(0.37)		
1999-01	–0.01	0.02**	0.77**	0.77	–0.13*	0.14	0.80**	0.39
	(–0.49)	(1–96)			(–2.57)	(0.30)		
2002-04	–0.03	0.03**	0.26*	0.36	–0.01**	0.01**	0.12**	0.40
	(–2.43)	(1.84)			(–1.86)	(1.94)		
2005-07	–0.14*	0.12	0.65***	0.48	–0.21	0.14	0.07***	0.40
	(–2.75)	(0.92)			(–3.04)	(0.87)		
1993-00	–0.14*	0.11	0.12**	0.49	–0.12	0.13	0.20**	0.41
	(–2.01)	(0.34)			(–0.57)	(0.78)		
2001-07	–0.13**	0.13***	0.14**	0.50	–0.14**	0.12**	0.76*	0.41
	(–2.84)	(1.74)			(–1.83)	(1.93)		
1993-07	–0.15**	0.14***	0.13*	0.53	–0.13**	0.14**	0.89*	0.42
	(–2.82)	(1.76)			(–1.94)	(1.93)		

Note: The t-values reported in the parenthesis is error adjusted Shanken t-values. The * shows significant at 1 percent, ** is significant at 5 percent and *** is significant at 10 percent level.

The asymmetric effect of positive and negative shock is measured by γ_t. If the coefficient is not equal to zero it would imply that the impact of negative and positive shocks is asymmetric. This coefficient is significant for 38 stocks with daily data, and for 24 stocks with monthly data. It is confirmed that good and bad news have asymmetric effect on volatility. Out of 38 significant parameters, 24 are negative (out of 24 cases 19 are negative with monthly data). This implies that volatility tends to fall in more cases when return surprises are negative, that is, when they come as bad news. For the remaining stocks γ_t is positive indicating that negative shocks cause more volatility than positive shocks. Ahmad and Qasim (2004) come up with the same conclusion using sector indices for the Pakistani market. The results of conditional CAPM and conditional Fama and French three-factor model extended for two-beta CAPM equation as the mean equation along with EGARCH specification are reported in the Appendix Table A5 and A6. Two market conditions are allowed to affect the conditional mean and variance of market return through the nonlinear threshold regime switching model. The results show that there is statistically significant difference in beta in high and low market conditions which suggests that the betas are significantly affected by high and low market conditions. In the variance equation the additional effect of negative effect on variance compared to positive effect is measured by γ_t. The results reveal that this coefficient is significant in 32 cases based on CAPM model and 36 cases based on Fama and French model. Out of 32 significant parameters, 16 are negative and out of 36 cases 25 are negative, which implies that variance tends to fall when return surprises are negative. In other words negative shocks cause the same volatility as the positive shocks. The coefficient for remaining cases is positive, indicating that in these firms negative shock causes more change in variance than positive shocks. The magnitude of coefficients however, shows that the incidence of asymmetry though significant is not very large. These results provide support for the theoretical proposition that negative shocks cause greater volatility than positive shocks. The parameters of sensitivity to firm attribute suggested by Fama and French (size, and book-to-market value), that is β_{SMB} and β_{HML} reported in Table A6 have shown a mixed relationship. The effect of increase in size of the firm and book-to-market value on asset return is not consistent as indicated by the estimated values of β_{SMB} and β_{HML}, but for most of the firms it is positive, while only for a few firms these factor loadings are negative.

After estimating two conditional betas for each stock corresponding to bull and bear market conditions, using the dual-beta-with-EGARCH models, the cross-section regressions are estimated with these betas to estimate the premium. The results of testing the conditional single factor CAPM with EGARCH specification are given in Table 3. The results show that there is positive and significant compensation on an average to bear conditional market risk in the period 1999-2001, 2002-2004, 1993-2000, 2001-2007 and in overall sample period 1993-2007. The intercept terms λ_0 are not significantly different from zero in most of the sub-periods. These results support the Sharpe-Lintner model when symmetry of beta is taken into account in the model. The results of cross-sectional regression using two-betas with Fama and French (1993) variables are reported in Table 4. The risk premium for high market conditions has the correct sign, negative in all sub-periods and is significantly different from zero in sub-periods 1993-1995, 1996-1998, 1999-2001, 2005-2007, 2001-2007 and the overall period 1993-2007. For low market conditions the risk premium is positive but significant in 1993-1995 and 1999-2001,

Table 4

Average Risk Premium for Conditional Fama French Model with High /Low Market

	λ_0	λ_H	λ_L	H_0: λ_H=λ_L	Λ_{SMB}	Λ_{HMLL}	R^2
1993-95	–0.33	–0.17	0.15*	0.27*	0.67**	0.53**	0.41
	(–0.88)	(–1.32)	(2.01)		(1.98)	(1.90)	
1996-98	–0.12	–0.24	0.19*	0.33*	0.31**	0.42**	0.40
	(–0.67)	(–1.67)	(2.24)		(1.88)	(1.92)	
1999-01	0.02	–0.23*	0.22***	0.25**	0.42	0.15*	0.41
	(0.92)	(–2.25)	(1.98)		(0.94)	(2.30)	
2002-04	–0.03	–0.27*	0.15**	0.29*	0.65**	0.52**	0.40
	(–2.43)	(–2.43)	(1.97)		(1.96)	(2.24)	
2005-07	0.03	–0.24*	0.21	0.52***	0.40*	0.70	0.43
	(–2.75)	(–2.75)	(0.92)		(3.04)	(0.87)	
1993-00	–0.01	–0.18	0.14**	0.47**	0.94*	0.71**	0.44
	(–0.97)	(–1.03)	(1.89)		(2.42)	(1.98)	
2001-07	–0.01**	–0.12**	0.15	0.43*	0.53**	0.80**	0.44
	(–0.68)	(–1.85)	(1.83)		(1.88)	(1.85)	
1993-07	–0.01**	–0.21**	0.17**	0.41*	0.73*	0.84**	0.45
	(–0.98)	(–1.98)	(1.95)		(2.07)	(2.09)	

Note: The t-values reported in the parenthesis is error adjusted Shanken t-values. The * shows significant at 1 percent, ** is significant at 5 percent and *** is significant at 10 percent level.

2005-2007, 2001-2007 and the overall period 1993-2007. In the other sub period the risk premium corresponding to up market is negative and for down market it is positive which supports the theoretical proposition and empirical findings. These results are consistent with the findings of Davis and Desai (1998) which show that if the relationship beta and returns are positive in bull market and bear market combined, it does not show up in aggregate unless the positive relationship is strong.

The results of dual-beta Fama and French model with EGARCH (1,1) are presented in Table 4. The risk premium for high market conditions is negative in all sub-periods and for down market it is positive which supports the theoretical proposition and empirical findings. When the dual beta CAPM is augmented by the size and style variables, the market risk premium for both high and low become positive and negative respectively for almost all sub-periods and overall sample period. The book-to-market value is positively and significantly priced except the sub-period 2005-2007. The premium of size of the firm is positive for 1993-95, 1996-98, 2002-04, 2001-2007 and 1993-2007. These results indicate that the conditional Fama and French (1993) model shows improvement in explaining the cross-section variation in the expected returns. These results are consistent with the ones obtained in a series of papers for US market by Fama and French (1992, 1993, 1995, 1997, 2004), which suggest that these variables have some role in explaining cross-section of expected return and these variables outperform the market returns. Similarly Chan, Hamao, and Lakonishol (1991) find a strong relationship between book-to-market value and average return in Japanese market, while Capual, Rowley, and Sharpe (1993) observe a similar effect that is book-to-market value effect in four European stock markets. Likewise Fama and French (1998) find that the price ratios produce the same results for twelve major emerging markets. Grundy and Malkiel (1996) and Davis and Dasai (1998), Kim and Zumwait (1979) document that downside risk may be a more appropriate measure of portfolio risk than the conventional single beta. Pettengill, *et al.* (1995) using the dual-beta framework find consistent and significant relationship between beta and return and positive payment for beta risk. For Australian resource and industrial sector, Faff (2001) finds contrary evidence that success of the model does not depend on a beta instability argument. Granger and Silvapulle (2003) find that for bull, bear and usual market conditions the risk premium is positive and significant for usual market condition while for extreme market conditions these are insignificant. Davis and Desai (1998) comparing the analysis of beta-return and return-firm size relationship across bull, bear and flat market conditions find that beta is a superior measure of down-market risk, while firm size is positive in flat market. Iqbal and Brooks (2007) also confirm that Fama and French three-factor model performs better than the higher moments CAPM model.

To sum up, it can be argued that the overall positive risk-return relationship could occur if the relationship is stronger in bear market than in bull market. However this is not the case in Pakistan where the relationship is marginally stronger in bull market than in the bear market.[15] Davis and Desai (1998) find that if the relationship beta and return is positive in bull market and bear market combined, it does not show up in aggregate like Fama and French (1992, 1993) because the beta-return relationship in the flat market is opposite to extreme market conditions: high beta stocks have lower return than low beta stocks. Based on these results one can say the dual-beta Fama and French three factor model performed very well in the conditional context compared to dual-beta conditional CAPM model.

5. CONCLUSION

The beta dynamics is investigated by asymmetric response of beta to bullish and bearish market environment applying the dual beta CAPM and dual beta Fama and French three factor model on the 50 stocks traded in Karachi Stock Exchange during 1993-2007. There is evidence of beta instability when its randomness is investigated. Comparing it in the high and low market conditions the results show that beta is higher in most of the cases in the bullish market than in the bearish market. These results are in accordance with the widely held view that betas increase (decrease) when the market is bullish (bearish). The Wald test pair-wise equality of up and down market betas is rejected. These findings suggest that there is difference in up and down market beta across stocks. These findings show that risk premium corresponding to up market is negative and the beta pricing parameter for down market is positive in all cases. However, these pricing parameters are significant in a few sub-periods. The dual beta CAPM is extended with Fama and French (1993) variables, size and book-to-market value, in unconditional and conditional settings. The conditional Fama and French (1993) model shows improvement in explaining the cross-section variation in the expected returns. The findings however suggest that investors receive a positive premium for accepting down-side risk, while a negative premium is associated with up-market beta, which is in accordance with theoretical proposition. It is observed that the dynamic size and style coefficient explains the cross-section of expected returns in almost all sub-periods and in the overall sample period. The results suggest that in case of Pakistani market when news asymmetry is taken into account to explain the relationship in terms of

[15]Davis and Desai (1998) findings show that when they combine both bull and bear market, the beta return relationship is slightly positive and their result shows that the difference between the lowest beta portfolio and the highest beta portfolio is 2.23 percent and the relationship is positive and monotonic.

beta and returns, the conditional Fama and French three factor model performs better than the conditional CAPM for comparing unconditional Fama and French three factor model and unconditional dual-beta CAPM.

Appendices

Appendix Table A1

List of Companies Included in the Sample

Name of Company	Symbol	Sector
Al-Abbas Sugar	AABS	Sugar and Allied
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	ASKL	Leasing Company
Bal Wheels	BWHL	Auto and Allied
Cherat Cement	CHCC	Cement
Crescent Textile Mills	CRTM	Textile Composite
Crescent Steel	CSAP	Engineering
Comm. Union Life Assurance	CULA	Insurance and Finance
Dadabhoy Cement	DBYC	Cement
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
Faisal Spinning.	FASM	Textile Spinning
FFCL Jordan	FFCJ	Chemicals and Pharmaceuticals
Fauji Fertiliser	FFCL	Fertiliser
Fateh Textile	FTHM	Textile Composite
General Tyre and Rubber Co.	GTYR	Auto and Allied
Gul Ahmed Textile	GULT	Textile Composite
Habib Arkady Sugar	HAAL	Sugar and Allied
Hub Power Co.	HUBC	Power Generation & Distribution
I.C.I. Pak	ICI	Chemicals and Pharmaceuticals
Indus Motors	INDU	Auto and Allied
J.D.W. Sugar	JDWS	Sugar and Allied
Japan Power	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
National Refinery	NATR	Fuel and Energy
Nestle Milk Pak Ltd	NESTLE	Food and Allied
Packages Ltd.	PACK	Paper and Board
Pak Electron	PAEL	Cables and Electric Goods
Pakistan Tobacco Company	PAKT	Tobacco
Pakland Cement	PKCL	Cement
Pakistan State Oil Company.	PSOC	Fuel and Energy
PTCL (A)	PTC	Fuel and Energy
Southern Electric	SELP	Cables and Electric Goods
ICP SEMF Modarba	SEMF	Modarba
Sitara Chemical	SITC	Chemicals and Pharmaceuticals
Sui Southern Gas Company	SNGC	Fuel and Energy
Sui Northern Gas Company	SSGC	Fuel and Energy
Tri-Star Polyester Ltd	TSPI	Synthetic and Rayon
Tri-Star Shipping Lines	TSSL	Transport and Communication
Unicap Modarba	UNIM	Modarba

Table A2

Summary Statistics of Daily Stock Returns

Company	No. of Obs.	Mean	St. Dev.	Skewness	Excess Kurtosis	Jarque-Bera
AABS	1990	0.13**	3.57*	0.65*	4.54*	1849.67*
ACBL	2697	0.10***	2.81*	–0.02	8.62*	8342.60*
AGTL	2094	0.21*	3.15*	0.40	11.48*	11556.03*
AICL	2681	0.08	3.54*	0.02	8.25*	7604.82*
ANSS	1544	0.00	7.75*	–0.61	11.34*	8364.52*
ASKL	2426	0.09	3.46*	0.22	8.32*	7016.92*
BWHL	1644	–0.01	4.61*	0.31	7.29*	3665.67*
CHCC	2491	0.07	3.42*	0.36**	4.36*	2023.86*
CRTM	2149	0.07	4.36*	0.20	11.14*	11127.45*
CSAP	1829	0.12	4.44*	0.49	12.77*	12504.90*
CULA	1664	0.06	4.31*	0.34	6.07*	2528.65*
DBYC	2166	0.00	6.57*	0.45	16.36*	24229.89*
DHAN	1489	–0.05	4.34*	1.37*	9.23*	5749.70*
DSFL	2707	0.02	3.25*	0.48**	4.85*	2753.04*
DWTM	385	–0.02	4.90*	0.68	11.43*	2125.84
ENGRO	2660	0.08	2.63*	0.11	8.55*	8107.69*
FASM	1405	0.18	2.96*	–1.28	23.45*	32574.22*
FFCJ	2080	0.03	3.26*	0.62**	7.23*	4656.48*
FFCL	2704	0.08	2.29*	–0.24	5.54*	3479.76*
FTHM	239	0.50	8.33*	0.39	5.63*	321.46*
GTYR	2192	0.08	3.51*	1.40*	13.89*	18339.20*
GULT	587	0.26	5.96*	0.43*	10.28*	2601.98*
HAAL	1863	0.20**	3.81*	0.45*	3.77*	1167.39*
HUBC	2380	0.08	3.13*	–0.81	17.86**	31877.97*
ICI	2667	0.03	2.90*	0.34	4.32*	2128.42*
INDU	2659	0.06	3.13*	0.59***	4.41*	2307.69*
JDWS	1716	0.14	5.74*	0.25*	8.01*	4607.77*
JPPO	1944	–0.02	4.10*	0.94*	8.13*	5637.21*
KESC	2702	–0.02	3.97*	0.69*	6.52*	5002.83*
LEVER	2429	0.06	2.35*	0.51**	8.54*	7491.23*
LUCK	2310	0.04	4.13*	0.47**	6.31*	3914.20*
MCB	2714	0.08	3.20*	–0.07	4.76*	2567.14*
MPLC	2430	–0.04	4.18*	0.54	3.75*	1540.80*
NATR	2391	0.09	3.19*	0.47***	6.14*	3850.41*
NESTLE	986	0.26**	4.18*	0.14	7.44*	2279.29*
PACK	1856	0.09	3.20*	–0.43	10.24*	8169.93*
PAEL	1933	0.02	5.79*	0.42	19.20*	29760.13*
PAKT	1862	0.01	3.97*	–0.02	9.26*	6654.47*
PKCL	1776	0.02	4.53*	0.21	5.57*	2307.90*
PSOC	2713	0.11***	2.71*	–0.28	11.19**	14189.96*
PTC	2402	0.03	2.80*	0.08	7.35*	5415.82*
SELP	2024	0.01	3.92*	–0.47	43.68*	161003.70*
SEMF	2598	0.10	3.14***	0.91***	9.67***	10486.12*
SITC	1807	0.09	3.24*	0.38	11.33*	9708.85*
SNGP	2711	0.08	3.13*	0.29	4.59*	2418.05*
SSGC	2706	0.05	3.25*	0.56	10.77*	13220.94*
TSPI	1833	–0.05	11.32*	0.12	7.71*	4542.77*
TSSL	1304	–0.11	8.79*	–0.34	18.43*	18478.51*
UNIM	1999	–0.04	10.35*	0.54	16.61*	23068.60*

Note: *Indicates significant at 1 percent, ** at 5 percent and *** is at 10 percent.

Table A3

Market Sensitivity for High and Low Market

	β_H	β_L	H_0: β_H=β_L	R^2	β_H	β_L	H_0: β_H=β_L	R^2
AABS	0.35*	38*	83*	03	0-31**	0.75	0.75	0.61
ACBL	0.96*	0.99*	0.51*	0.35	1.24*	0.99*	0.60*	0.59
AGTL	0.54*	0.37*	0.11*	0.06	0.94*	0.51*	0.03	0.64
AICL	0.96*	0.99*	0.51*	0.35	1.24*	0.99*	0.60*	0.64
ANSS	0.41**	0.79*	0.36*	0.01	1.26*	0.47*	0.36*	0.63
ASKL	0.76*	0.78*	0.90*	0.25	1.15*	0.93*	0.95*	0.67
BWHL	0.50*	0.90*	0.06***	0.26	0.43	0.23**	0.71*	0.61
CHCC	0.87*	0.84*	0.76*	0.17	1.26*	0.97*	0.19**	0.59
CRTM	0.63*	1.00*	0.02	0.19	1.56*	0.96*	0.05	0.62
CSAP	0.75*	0.68*	0.74*	0.26	0.69*	0.66*	0.001	0.63
CULA	0.66*	0.63*	0.89*	0.27	1.25*	0.38*	0.93*	0.63
DBYC	0.96*	1.51*	0.03	0.19	1.93*	1.18*	0.18**	0.68
DHAN	0.95*	0.69*	0..10*	0.23	0.70*	0.90*	0.49*	0.62
DSFL	1.21*	1.18*	0.72*	0.38	1.40*	1.33*	0.15**	0.66
DWTM	0.31	0.70*	0.47*	0.02	0.02	0.16*	0.60***	0.65
ENGR	0.81*	0.91*	0.19*	0.27	0.57*	0.78*	0.91*	0.66
FASM	0.31**	0.73*	0.16*	0.22	1.00*	0.63*	0.47*	0.66
FFCJ	1.16*	1.14*	0.76*	0.4	0.07	–0.03	0.79*	0.58
FFCL	0.88*	0.85*	0.63*	0.41	0.73*	0.82*	0.67*	0.62
GTYR	0.51*	0.70*	0.10*	0.29	0.66**	0.71*	0.89*	0.67
GULT	0.23	0.38***	0.731	0.01	–0.25	0.14	0.30*	0.62
HAAL	0.30*	0.61*	0.02	0.05	0.73*	0.56*	0.61*	0.67
HUBC	1.21*	1.37*	0.01	0.54	0.63*	1.32*	0.01	0.59
ICI	1.18*	1.09*	0.26*	0.41	0.91*	1.38*	0.08**	0.62
ICPS	1.09*	0.93*	0.10*	0.3	1.47*	1.05*	0.143**	0.59
INDU	0.803*	0.74*	0.49*	0.2 7	1.27*	0.89*	0.19**	0.62
JDWS	0.46*	0.17**	0.23*	0.21	0.92	0.41*	0.26*	0.67
JPPO	1.43*	1.24*	0.11*	0.35	1.71*	0.89*	0.01	0.59
KESC	1.51*	1.33*	0.06**	0.37	1.53*	1.63*	0.75*	0.64
LEVER	0.48*	0.50*	0.78*	0.23	0.29**	0.55*	0.20*	0.63
LUCK	1.19*	1.21*	0.87*	0.22	1.42*	1.13*	0.34*	0.59
MCB	1.14*	1.21*	0.38*	0.39	1.39*	1.23*	0.51*	0.65
MPLC	1.29*	1.14*	0.21*	0.25	1.74*	1.15*	0.11*	0.64
NATR	0.80*	0.78*	0.85*	0.27	1.05*	0.83*	0.47*	0.65
NESTE	0.47*	0.62*	0.53*	0.24	–0.09	–0.02	0.79*	0.62
PACK	0.49*	0.55*	0.61*	0.27	0.64*	0.68	0.86*	0.65
PAEL	0.93*	0.79*	0.53*	0.26	1.99*	0.68*	0.04	0.63
PAKT	0.46*	0.85*	0.03	0.26	1.61*	0.51*	0.02	0.62
PKCL	0.81*	0.90*	0.577*	0.1	0.17	0.84*	0.18**	0.64
PTC	1.09*	1.14*	0.41*	0.49	0.85*	1.38*	0.02	0.71
PSO	1.40*	1.30*	0.06**	0.72	0.74*	1.13*	0.03	0.69
SELP	1.28*	1.28*	0.95*	0.35	0.87*	0.91*	0.92*	0.63
SITC	0.57*	0.39*	0.16**	0.16	0.76*	0.54*	0.34*	0.63
SNGP	1.23*	1.27	0.611*	0.46	1.42*	1.36*	0.07**	0.71
SSGC	1.23*	1.16*	0.41*	0.39	1.42*	1.23*	0.37*	0.71
TSPI	0.4	1.03*	0.20*	0.21	1.23*	0.75*	0.46*	0.62
TSSI	0.22	0.67*	0.28*.	0.21	0.35	0.39*	0.94*	0.64
UNIM	0.78*	1.04*	0.52*	0.22	1.11*	0.81*	0.66*	0.69

Note: *Indicates significant at 1 percent, ** at 5 percent and *** is at 10 percent.

Table A4

CAPM-with EGARCH Specification Based on Monthly Data

	α	β	γ_0	δ	γ_i	μ_i	R^2
AABS	0.02*	0.22*	–2.76*	–0.35**	0.55*	0.32*	0.57
ACBL	0.02*	1.03*	–0.33	0.07	–0.12*	0.94*	0.54
AGTL	0.02*	0.72*	–8.47*	0.41*	–0.05**	–0.92**	0.62
AICL	0.03*	1.42*	–2.50**	0.54*	–0.14	0.46***	0.71
ANSS	–0.01	0.39*	–1.82*	0.54*	0.17***	0.63*	0.69
ASKL	0.01	0.91*	–5.09**	0.49**	–0.11	–0.11	0.67
BWHL	–0.01	0.19**	–0.56*	0.21*	–0.14**	0.89*	0.63
CHCC	0.02*	0.98*	–6.89*	0.58*	–0.22***	–0.36***	0.69
CRTM	0.01	0.96*	–5.09	0.27	0.11	–0.15	0.70
CSAP	0.02***	0.60*	–7.59*	–0.14	–0.16***	–0.80*	0.73
CULA	0.02	0.001	–0.35*	0.17*	0.07	0.94*	0.71
DBYC	0.01	1.44*	0.05	–0.13*	–0.04	0.99*	0.66
DHAN	–0.01	0.93*	–3.60**	–0.27**	0.12	0.08	0.62
DSFL	0.01	1.37*	–4.93***	0.20	0.05	–0.11	0.66
DWTM	0.03	0.001	–1.98*	0.52*	–0.09	0.70*	0.70
ENGRO	0.01***	0.79*	–5.30	0.18	–0.10	–0.13	0.75
FASM	0.01	0.62*	–0.09*	–0.09*	–0.11*	0.96	0.65
FFCJ	0.001	0.004	–1.12*	0.50*	–0.10	0.82*	0.65
FFCL	0.01**	0.75*	–0.67	0.19**	–0.10**	0.90**	0.62
GTYR	0.02*	0.55*	–7.17*	1.03*	–0.08	–0.58*	0.66
GULT	0.01	0.14*	–1.50*	0.70*	–0.20***	0.75*	0.62
HAAL	0.01	0.49*	–1.11*	0.41*	0.08	0.81*	0.76
HUBC	0.02*	1.11*	–7.57*	0.26	–0.46*	–0.55*	0.56
ICI	0.002	1.29*	–3.79**	0.29	–0.08	0.23	0.61
ICPSEMF	0.02*	1.31*	–3.07*	0.80*	–0.34*	0.47*	0.67
INDU	0.01	0.88*	–6.07*	0.003	0.34*	–0.34	0.71
JDWS	0.01	0.27*	–5.83*	0.62*	0.16***	–0.47*	0.71
JPPO	0.01	0.91*	–1.51*	0.56*	0.01	0.74*	0.65
KESC	0.01	1.57*	–0.79	0.17**	–0.12**	0.85*	0.64
LEVER	0.01	0.47*	–2.46*	0.74*	–0.46*	0.64*	0.69
LUCK	0.01	1.18*	–6.71*	0.18	0.05	–0.50	0.69
MCB	0.01**	1.23*	–8.42*	0.18	0.24*	–0.69*	0.65
MPLC	0.002	1.26*	–3.98*	0.54**	0.11	0.10	0.63
NATR	0.02	1.05*	–2.77*	0.35**	–0.10	0.43**	0.63
NESTLE	0.03	0.002	–0.773	0.513	–0.243	0.893	0.69
PACK	0.01	0.67*	–7.63*	0.40*	–0.31*	–0.47*	0.65
PAEL	–0.01	0.81*	–3.87*	0.19**	–0.24*	–0.03	0.68
PAKT	0.01	0.701	–1.421	0.531	0.261	0.751	0.67
PKCL	0.00	0.78*	–5.78*	0.18	–0.03	–0.67***	0.63
PSO	0.03*	1.22*	–3.46**	0.12	–0.34*	0.33	0.68
PTC	0.01	1.19*	–2.21*	0.81*	0.10	0.71*	0.68
SELP	0.02*	0.003	–0.01	–0.34*	–0.68*	0.95*	0.64
SITC	0.02	0.67*	–0.03	–0.18*	–0.26*	0.96*	0.67
SNGP	0.01*	1.25*	–9.58*	0.28*	0.17*	–0.87*	0.70
SSGC	0.01***	1.28*	–0.78*	0.21*	0.07	0.88*	0.70
TSPI	–0.02	0.95*	–1.37*	0.49*	0.08	0.66*	0.88
TSSl	–0.03*	0.58*	0.08	–0.16*	–0.03	0.98*	0.73
UNIM	0.01	0.73*	–0.60	0.04	0.14**	0.79*	0.88

*Note:**Indicates significant at 1 percent, ** at 5 percent and *** is at 10 percent.

Table A5

CAPM in Bull and Bear Market with EGARCH Specification Based on Monthly Data

	β_H	β_L	H_0: $\beta_H=\beta_L$	h_0	δ_i	γ_i	μ_i	θ_H	θ_L	H_0:$\theta_H=\theta_L$	R^2
AABS	0.48*	0.31*	0.11*	–4.49*	0.51*	0.01	0.39	2.17^	1.07*	0.03	0.63
ACBL	0.93*	0.91*	0.95*	–2.47*	0.41*	–0.14	0.73*	1.28*	2.94*	0.01	0.65
AGTL	0.42*	0.49*	0.49*	–2.71*	0.55*	0.07*	0.69*	1.42*	1.80*	0.42*	0.66
AICL	0.82*	1.09*	0.001	–0.40*	0.28*	–0.03*	0.97*	–0.26*	0.67*	0.01	0.64
ANSS	0.68*	0.70*	0.92*	–0.18*	0.15*	–0.04*	0.99*	2.98*	–0.56*	0.01	0.61
ASKL	0.65*	0.64*	0.95*	–2.78*	0.53*	0.01	0.67*	1.46*	3.17*	0.01	0.55
BWHL	0.45*	0.76*	0.11*	–0.26*	0.18*	–0.03*	0.98*	1.37*	0.41*	0.02	0.66
CHCC	0.95*	0.82*	0.16*	–1.35*	0.34*	0.02	0.85*	1.79*	0.59*	0.01	0.57
CRTM	0.78*	0.89*	0.47*	–0.72*	0.21*	0.01	0.92*	1.51*	0.30**	0.01	0.59
CSAP	0.72*	0.50*	0.10*	–0.55*	0.31*	–0.05*	0.95*	2.01*	–0.18	0.01	0.56
CULA	0.001	0.07*	0.04	–0.50*	0.41*	–0.03*	0.97*	0.58*	0.22*	0.13*	0.61
DBYC	1.41*	1.24*	0.38*	–1.02*	0.37*	–0.05*	0.88*	2.76*	1.42*	0.01	0.68
DHAN	1.03*	0.78*	0.11*	–1.43*	0.31*	0.03*	0.83*	3.59*	0.61*	0.02	0.63
DSFL	1.19*	1.34*	0.03	–1.01*	0.28*	0.05*	0.90*	1.47	0.68*	0.01	0.58
DWTM	0.43	0.44*	0.99*	–0.55*	0.09*	0.15*	0.94*	7.50*	2.79*	0.01	0.62
ENGR	0.96*	0.88*	0.15*	–4.80*	0.91*	0.01	0.45*	3.09*	1.66*	0.01	0.66
FASM	0.28*	0.77*	0.03	–0.96*	0.43*	0.01	0.90*	1.61*	5.94*	0.02	0.62
FFCJ	1.17*	1.04*	0.13*	–2.29*	0.41*	–0.06*	0.74*	1.91*	0.71*	0.01	0.64
FFCL	0.86*	0.83*	0.57*	–1.45*	0.19*	0.01	0.84*	1.05*	1.69	0.10*	0.61
GTYR	0.58*	0.71*	0.19*	–1.61*	0.43*	0.05*	0.82*	2.16*	0.63**	0.002	0.59
GULT	0.52*	0.72*	0.52*	–0.38*	0.24*	0.07*	0.96*	1.00*	0.32	0.22*	0.61
HAAL	0.45*	0.43*	0.92*	–1.37*	0.32*	0.01	0.83*	–0.24	1.17	0.03	0.64
HUBC	1.17*	1.07*	0.070*	–1.42*	0.34*	–0.03*	0.86*	1.97*	2.11*	0.09*	0.52
ICI	1.14*	1.10*	0.61*	–1.95*	0.35*	–0.10*	0.78*	2	1.19*	0.02	0.61
ICPS	1.11*	1.02*	0.17*	–2.33*	0.49*	–0.05*	0.74*	2.81*	1.99*	0.10*	0.53
INDU	0.86*	0.78*	0.38*	–0.70*	0.17*	0.02*	0.92*	1.15	0.46	0.001	0.57
JDWS	0.41*	0.25*	0.34*	–0.81*	0.38*	0.06*	0.91*	1.57*	0.99*	0.11*	0.51
JPPO	1.18*	1.28*	0.36*	–1.50*	0.33*	0.02	0.82*	1.92*	0.65*	0.02	0.55
KESC	1.46*	1.34*	0.23*	–1.24*	0.25*	–0.01	0.86*	2.18*	1.04	0.03	0.57
LEVE	0.41*	0.38*	0.65*	–1.71*	0.41*	–0.04*	0.82*	1.82	1.27*	0.21*	0.53
LUCK	1.17*	1.48*	0.003	–0.64*	0.26*	–0.04*	0.94*	0.49*	1.41*	0.002	0.61
MCB	1.13*	1.18*	053*	–1.97*	0.29*	0.07*	0.77*	1.02*	1.50*	0.30*	0.69
MPLC	1.38*	1.24*	0.26*	–1.86*	0.26*	0.04	0.76*	2.49*	1.07*	0.001	0.64
NATR	0.86*	0.74*	0.22*	–1.18*	0.27*	0.03*	0.87*	2.34*	1.28*	0.003	0.67
NESTE	0.33*	0.18*	0.27*	–0.61*	0.38*	0.01	0.95*	0.19	0.54	0.57*	0.63
PACK	0.44*	0.47*	0.727*	–0.72*	0.27*	–0.01	0.93*	0.44*	1.76*	0.01	0.67
PAEL	0.68*	0.70*	0.82*	–0.47*	0.39*	–0.06*	0.97*	0.85*	0.29	0.09**	0.65
PAKT	0.47*	0.65*	0.18*	–0.52*	0.29*	0.01	0.96*	0.33	1.13*	0.021	0.66
PKCL	0.89*	0.64*	0.10*	–0.91*	0.38*	–0.04*	0.91*	1.23*	0.65*	0.23*	0.63
PTC	1.29*	1.23*	0.15*	–1.58*	0.40*	0.03*	0.86*	1.93*	2.09*	0.59	0.71
SELP	1.03*	1.16*	0.12	–0.51*	0.19*	–0.07*	0.95*	0.50*	1.09*	0.01	0.64
SITC	0.42*	0.44*	0.89*	–0.48*	0.32*	0.01	0.96*	0.59	0.16	0.29*	0.65
SNGP	1.24*	1.27*	0.62*	–1.93*	0.32*	0.02*	0.79*	2.41*	1.97	0.19*	0.66
SSGC	1.22*	1.21*	0.05	–1.81*	0.36*	–0.02*	0.80*	2.87	1.27*	0.002	0.69
TSPI	1.03*	1.61*	0.09**	–0.38*	0.25*	–0.06*	0.96*	1.07*	0.95*	0.76*	0.62
TSSI	0.75*	0.78*	0.94*	–0.04*	0.02*	–0.05*	0.99*	1.23*	–0.16*	0.01	0.69
UNIM	1.55*	1.23*	0.28	–0.11*	0.12*	0	0.99*	0.37*	–0.23*	0.001	0.71

Note: *Indicates significant at 1 percent, ** at 5 percent and *** is at 10 percent.

Table A6

Fama French Three Factor Model in Bull and Bear Market with EGARCH Specification Based on Monthly Data

	β_H	β_L	β_{SMB}	B_{HML}	H_0: $\beta_H=\beta_L$	h_0	δ_i	γ_i	μ_i	θ_H	θ_L	H_0:θ_H= θ_L	R^2
AABS	0.65*	0.17*	0.29	0.56	0.40*	–2.83*	0.33*	0.51*	0.28*	–1.42*	15.4*	0.18*	0.63
ACBL	0.99*	1.11*	0.12*	0.22*	0.24*	–6.18*	–0.07	–0.13	–0.31	37.41	–23.50*	0.22	0.54
AGTL	0.87*	0.39*	0.36	0.39	0.34*	–8.32*	0.94*	–0.02	–0.76*	1.84	13.51*	0.42*	0.56
AICL	1.86*	1.32*	0.30	0.17	0.49*	(–2.34)	0.54*	–0.22**	0.52**	24.76	0.95	0.87*	0.55
ANSS	1.95*	0.46*	0.56	0.20	0.32*	(–5.14)	0.60*	0.27*	–0.14	71.03	10.86	0.54*	0.63
ASKL	1.22*	0.86*	0.80	0.59	0.88*	(–5.53)	0.53**	–0.07	–0.18	28.7	4.24	0.61*	0.71
BWHL	0.53*	0.48*	0.10	0.64	0.93*	–5.79*	0.04	0.15	–0.40*	–18.34*	29.04*	0.61*	0.70
CHCC	1.45*	0.94*	0.38	0.11	0.12**	–0.68*	–0.64*	–0.19*	0.78*	–19.76*	17.43*	0.14**	0.69
CRTM	1.66*	0.90*	0.24	0.80	0.05	–0.49	0.03	0.12	0.85	–22.49	–14.80*	0.01	0.62
CSAP	0.66*	0.69*	0.17	0.13	0.003	–3.96**	–0.28**	–0.06	0.03	–11.14	6.9	0.21**	0.73
CULA	0.02	0.40*	0.3	0.14	0.61*	–6.49*	–0.86	–0.25*	–0.15	21.22*	17.36*	0.78*	0.68
DBYC	2.04*	1.20*	0.39	0.90	0.25*	–1.16	0.18	0.08	0.74*	–3.35	8.54	0.31*	0.62
DHAN	0.49*	0.73*	0.023	0.033	0.98*	–9.08*	0.54*	0.37*	–0.79*	10.76	18.44*	0.74*	0.56
DSFL	1.50*	1.40*	0.004	0.003	0.15**	–4.27*	0.27**	0.04	0.1	7.75	17.02*	0.13	0.67
DWTM	0	0.02*	0.041	0.025	0.49*	–1.36*	0.36*	–0.09	0.77*	–38.53*	–20.77*	0.01	0.62
ENGRO	0.90*	0.96*	0.11	–0.06*	0.96*	–0.56*	–0.38*	–0.04	0.87*	13.42*	17.16*	0.11*	0.67
FASM	1.07*	0.71*	0.040	0.036	0.03	–0.11	–0.33*	–0.13	0.91*	–11.54*	3.38***	0.23**	0.64
FFCJ	0.56	0.18*	0.21*	0.34	0.99*	–0.53*	0.25**	–0.15*	0.92*	–4.28	1.81	0.57*	0.69
FFCL	0.71*	0.80*	0.001	–0.008	0.67*	–1.5	–0.01	–0.11	0.74*	0.4	13.39**	0.33*	0.62
GTYR	0.28*	0.56*	0.041	–0.020	0.20**	–7.21*	1.11*	–0.13*	–0.56*	–10.22	–0.77	0.78*	0.64
GULT	–0.03	0.05	0.24	0.41	0.81*	–3.52*	0.38*	–0.79**	0.33*	72.29*	40.33*	0.10**	0.63
HAAL	0.63*	0.49*	0.28	0.45	0.56*	–0.64**	0.30**	–0.04	0.85*	–27.9**	–21.9**	0.72*	0.69
HUBC	0.35	0.92*	0.30	0.61	0.07**	–3.87*	–0.13	–0.03	0.32	81.68*	57.69*	0.48*	0.63
ICI	0.81*	1.38*	0.31	0.25	0.04	–1.01*	–0.07	0.02	0.78*	–36.1**	9.65***	0.03	0.63
ICPS	1.56*	1.29*	0.015	–0.030	0.32*	–3.14*	0.82*	–0.33*	0.49*	35.43	7.67	0.30*	0.71
INDU	0.94*	0.83*	0.39	0.43	0.41*	–5.60*	–0.06	0.40*	–0.26	(–47.2)	8.18	0.001	0.72
JDWS	0.68*	0.06*	0.36	0.14	0.04	–7.52*	0.85*	0.07	–0.73	2.53	–20.20*	0.41*	0.74
JPPO	1.71	0.002	0.28	0.13	0.001	–2.09*	0.92*	–0.27*	0.78*	63.76*	30.33*	0.100**	0.79
KESC	1.14*	1.45*	0.51	0.46	0.45*	–5.05*	0.34**	–0.03	0.01	35.86	36.70*	0.97*	0.68
LEVER	0.49*	0.51*	0.11	0.32	0.79*	–2.55*	0.52*	–0.39*	0.61*	–11.45*	16.58**	0.001	0.69
LUCK	1.50*	1.12*	0.19	0.25	0.18**	–5.53*	0.29	0.06	–0.16	–14.34	23.86*	0.59*	0.70
MCB	1.35*	1.21*	0.32	0.12	0.62*	–8.36*	0.26	0.22**	–0.68*	–3.74	–12.01	0.81*	0.68
MPLC	1.24*	1.27*	0.14	0.26	0.94*	–4.49*	0.48*	0.15	0.04	21.73	21.77*	0.99*	0.59
NATR	1.05*	0.88*	0.23	0.34	0.69*	–1.44*	–0.22*	–0.1	0.69*	66.07*	17.48*	0.003	0.72
NESTE	0.37*	0.21*	0.25	0.13	0.38*	–9.56*	0.801*	–0.12*	–0.77*	–17.57	15.31*	0.23*	0.73
PACK	0.61*	0.60*	0.26	0.15	0.956*	–8.39*	0.63*	–0.28*	–0.53*	–10.9	24.46*	0.34*	0.69
PAEL	1.93*	0.59*	0.27	0.29	0.003	–3.47*	0.19**	–0.29*	0.1	–9.26	–1.34	0.833*	0.62
PAKT	1.25*	0.43*	0.17	0.30	0.02	–0.28**	–0.34*	0.09**	0.91*	17.49*	14.87*	0.60*	0.59
PKCL	0.39	0.90*	0.10	0.15	0.60*	–2.63	0.04	–0.01	0.21	12.4	–9.57	0.58*	0.74
PTC	0.82*	1.30*	0.32	0.28	0.02	–4.68*	0.03	–0.13	0.16	4.82	34.54*	0.67*	0.65
PSO	0.85*	1.27*	0.25	0.27	0.01	–1.75	0.67*	0.1	0.81*	6.07	16.14*	0.70*	0.59
SELP	1.11*	0.67*	0.35	0.51	0.001	–1.79*	–0.52*	–0.63*	0.57*	–65.10*	32.87*	0.003	0.71
SITC	0 .83*	0.63*	0.10	0.47	0.20*	0.06	(–0.09*	–0.20*	0.98*	–12.93*	–0.06	0.99*	0.56
SNGP	1.37*	1.33*	0.32	0.24	0.68*	–2.87*	–0.27*	0.03	0.46*	66.22*	28.90*	0.45*	0.67
SSGC	1.61*	1.23*	0.42	0.15	0.003	–0.1	–0.21	–0.11	0.95	–8.88	3.6	0.12**	0.64
TSPI	1.1	0.90*	0.57	0.25	0.83*	–1.24*	0.42*	0.07	0.69*	13.11	–3.2	0.62*	0.63
TSSl	0.46*	0.40*	0.31*	0.27	0.49*	–5.79*	6.28**	–0.07	–0.65*	–33.5*	–6.88	0.30*	0.71
UNIM	0.74	0.52	0.047	0.033	0.75*	–0.44	0.10	0.07	0.80	–20.49	–17.49		

Note: *Indicates significant at 1 percent, ** at 5 percent and *** is at 10 percent.

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