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Asset Pricing Model Conditional on Up and Down Market for Emerging Market: The Case of Pakistan

Nida Shah
Lecturer, Department of Management Sciences, Isra University, Hyderabad, Pakistan
E-mail: nida.shah@isra.edu.pk

Javaid Dars
Assistant Professor, Department of Management Sciences, Isra University, Hyderabad, Pakistan
E-mail: dars.javaid@isra.edu.pk

Dr. Muhammad Arshad Haroon
Adjunct Assistant Professor, Department of Management Sciences, Isra University Hyderabad, Pakistan
E-mail: arshad.haroon@isra.edu.pk

Abstract
This study proposes an asset pricing model conditional on up and down market for emerging market and tests its validity in Pakistan on individual stocks of Karachi Stock Exchange from July 2004 to December 2012. The basic capital asset pricing model is also tested. The results indicate that when emerging market undergoes negative market excess return, basic capital asset pricing model is inaccurate to predict stock returns. Although the conditional asset pricing model accurately predicts the risk-return trade off with beta as sole determinant of stock returns when there is up market, however yet it is significantly variant during down market where significant impact of residuals is evinced on stock returns. The market excess returns of up and down markets are also found asymmetric. The study implies that conditional asset pricing model can be an adequate technique for investors and portfolio managers considering investments in emerging markets.
Keywords: Asset Pricing Model, Conditional, Pakistan, Emerging Market, Up Market, Down Market.
JEL Codes: C21, C22, G10, G12, G17

1. Introduction

The Capital Asset Pricing Model (CAPM) is the renowned and widely understood one risk factor model (Davis et al., 2000), which provides a positive linear relationship between systematic risk (beta) and expected return on assets (Horne, 2004; Javid, 2010). It was formulated simultaneously by Nobel Laureate Sharpe (1964), Treynor (1962), Lintner (1965a, b) and Mossin (1966). Many researchers have questioned the validity of CAPM since its inception. Even though, after four decades of breakthrough, it continues to be applied to estimate the cost of equity capital for firms by the finance managers and to evaluate the performance of managed portfolios (Fama and French, 2004). Its powerful simple logic and instinctively pleasing predictions about the risk of an investment and its association with expected return has immensely aroused its attraction (Fama and French, 2004).

The Capital Asset Pricing Model (CAPM) proposes that beta is the sole and sufficient determinant of return. It is based on the implication that investments attributing higher beta risk should reward higher return, given that investors are risk averse. (Reilly and Brown, 2006). The mathematical expression for the CAPM is:

$$ER_X = R_{rf} + \beta_X(ER_m - R_{rf}) \quad (1)$$

Where,

ER_X is the expected return on security x, R_{rf} is risk free rate of return, ER_m is the expected return on market portfolio, β_X is the measure of systematic risk equals to the covariance of any security x return with the variance of market return.

Numerous implications and extensions have occurred in the CAPM to provide accommodation for real world complexities (Perold, 2004). Some of the eminent implications and extensions include: (1) Relaxing the assumption of homogenous expectations of investors by permitting heterogeneous expectations of returns by Lintner (1969) and Merton (1987). (2) Elimination of risk free lending and borrowing rate through introduction of zero-beta model (that uses zero beta portfolio in place of risk free rate) by Black (1972) - also known as two factor model; assuming some assets are nonmarketable (Mayers, 1973). (3) Development of Intertemporal Capital Asset Pricing Model (ICAPM) by Merton (1973) and Consumption based Capital Asset Pricing Model (CCAPM) by Breeden (1979) to permit multiple time periods and investment opportunities that change across periods. (4) Expansions for international investment by Solnik (1974), Stulz (1981) and Adler and Dumas (1983). (5) Development of multifactor model based on Arbitrage reasoning by Ross (1976). (6) Inclusion of broad macroeconomic variable in the model by Chen, Roll and Ross (1986). (7) Deployment of Characteristic based

approach to form multifactor model, also known as three factor model by Fama and French (1993). (7) The market proxy in test of CAPM to be mean-variance efficient on the Markowitz efficient Frontier and a true optimum market portfolio by Roll (1977, 1978, 1980, 1981).

Pettengill et al. (1995) raised an important criticism on the validity of CAPM by reasoning that despite the theoretical CAPM is based on ex-ante returns; the applicability of model is tested using ex-post returns. In ex-ante based CAPM the market return cannot fall short of the risk free rate. However, in ex-post based CAPM, the market return can fall short of the risk free rate, which invalidates the risk-return relationship predicted by the theory and may lead to misinterpretation, inadequate forecasting and huge losses. This phenomenon is empirically evinced in many developed and emerging equity markets. Among them are NYSE (Fama and French, 1992, 1993, 1996), developed European markets (Fletcher, 2000), Tokyo Stock exchange (Nimal and Fernando, 2010; Hodoshima et al., 2000), UK stock market (Hung et al., 2004), emerging markets of Europe (Zhang and Wihlborg, 2010), Colombo stock exchange (Sriyalatha, 2010; Theriou et al., 2010), Honk Kong Exchange (Lam, 2001), German stock market (Elsas et al., 2000), stock markets in Latin American countries (Sandoval and Saens, 2004), Istanbul Stock Exchange (Ozturk, 2009; Gursoy and Rejepova, 2007), Malaysian Islamic Unit Trust (Shakrani and Ismail, 2003), Korean stock market (Bark, 1991), and Karachi Stock Exchange (Javid and Ahmad, 2008).

Zhang and Wihlborg (2010) concluded in their study that the emerging markets possess higher return volatility and frequent negative market excess returns, therefore it is necessary to adjust asset pricing models for distinguished up and down market periods to estimate returns in emerging equity markets. Furthermore, equity markets of developed countries have also evinced a weak risk return trade-off (Fama and French, 1998). This core purpose of this study is to formulate an asset-pricing model conditional on Up and Down market periods by combining Fama and MacBeth (1973) and Pettengill et al. (1995) asset-pricing models and to make a unique attempt of testing its applicability in case of Pakistani Equity Market. Hopefully, this study is going to provide a pragmatic solution to aforesaid problem in asset-pricing and proves to be instrumental for market participants and prospective investors in making sound Investment decisions, for portfolio managers in designing efficient portfolios and for finance managers in determining cost of capital.

2. Prior Work

2.1 Tests of CAPM on International equity Markets

The applicability of CAPM is an intensely debated topic in finance literature. A number of studies have been conducted to test CAPM but only few of them proved its applicability. Dzaja and Aljinovic (2013) refuted the applicability of CAPM as an adequate asset valuation model for emerging securities markets of nine countries of Central and South-East Europe. Besides, Osamwonyi and Asein (2012) acknowledged a positive linear relationship between market betas and security returns for sampled firms in Nigerian Capital Market using Time series OLS regression to test the model. Basu and Chawla (2010) tested fundamental CAPM in Indian context by forming 10 portfolios comprising 50 stocks. They found a negative risk-return relationship indicating towards an inefficient market. Moreover, the residual variance (a measure of unsystematic risk) significantly affected the portfolio returns. In general, they concluded that fundamental CAPM has completely failed in Indian capital market. Similarly, Choudhary and Choudhary (2010) also refuted CAPM in main capital market of India, Bombay Stock Market. However, the study bolstered the assumption of CAPM that no variable other than beta affects the portfolio returns and the study found credence on linearity of risk return relationship as predicted by CAPM. Moreover, Nikolaos (2009) researched on the London Stock Exchange by employing two-step regression procedure. Findings credited beta a reliable measure of risk but CAPM was rejected. Though, the constant and beta were found significantly compatible to the theory. The value of R^2 was relatively low and the MRP (Slope of SML) estimated by CAPM was different from actual one. Michailidis et al. (2006) studied the validity of CAPM in emerging market of Greek by studying Athens Stock Exchange by employing Fama and MacBeth (1973) test of CAPM. The study refuted the basic hypothesis for CAPM that risky securities yield higher return. Besides, the study supported the hypothesis of linear structure of risk-return relationship. The intercept was not found equal to zero and they concluded no impact of residual risk on the returns. Groenewold and Fraser (1997) compared Standard CAPM with Arbitrage Price Theory (APT) and Generalized Auto-Regressive Conditional Heteroskedasticity (GARCH) model in eight sectors of Australian stock market covering period 1983-1993. The Chen, Roll, Ross (1986) methodology was employed on the study. They found results in favor of GARCH and APT model and tagged CAPM as a model misleading to predict expected returns. In earlier times, Tinic and West (1984) rejected the validity of CAPM after studying all listed stocks of NYSE from 1935 to 1982. They concluded that although the residual risk does not affect the stock returns and the intercept is much higher than risk free rate. Fama and MacBeth (1973) introduced a three-step methodology by testing CAPM in NYSE from 1926 to 1968. The period under study was divided into nine overlapping analysis periods. Each analysis period contained three sub-periods (1) Portfolio formation period (2) Beta Estimation Period and (3) Testing Period. Findings concluded a positive risk- return relationship. Many earliest studies on CAPM were

based on individual assets returns. Miller and Scholes (1972) tested the validity of CAPM on returns of individual securities. The results were not encouraging; intercept value was found much larger than risk free rate and the beta coefficient was low although statistically significant. Douglas (1969) and Lintner (1965a) first tested CAPM in the excess-return form. They found that the residual risk affect asset returns.

2.2 Tests of CAPM on Pakistani Equity Market

Numerous studies have been conducted in Pakistani perspective to test the validity of CAPM but only few confirmations were produced. One study in this perspective commenced by Rizwan et al. (2013) who investigated the applicability of CAPM on the Cement sector of Pakistan. The data comprised of monthly stock returns of companies listed in the KSE from 2004 to 2009. The results elucidated that CAPM is not a reliable tool for accurately forecasting returns in the cement industry of Pakistan. They also revealed that the expected portfolio returns kept unaffected by the residual risk. Khan et al. (2012) concluded limited applicability of CAPM in Pakistan. National Savings Certificate and KSE-100 Share Index served as proxy for risk free asset and market portfolio. Furthermore, they suggested to take a large sample for future research. Raza et al. (2011) acknowledged the CAPM model in Pakistan. They analyzed on monthly, quarterly and semiannual returns of 387 companies belonging to 30 different sectors of KSE. The Paired sample t- test was used to compare realized and expected returns. The results also argued that CAPM performs better in predicting returns for short-term investment rather than long term. Zubairi and Farooq (2011) compared the explanatory power of CAPM and APT in KSE over the period January 2004 to December 2009. The actual returns were compared with the returns predicted by CAPM. KSE-100 Share Index and KIBOR (Karachi Interbank Offshore Rate) served as benchmark for market portfolio and risk free asset respectively. Findings concluded that neither of the theory proved valid the predicting stock returns. Similarly, Hanif (2010) also rejected CAPM in Pakistan by analyzing the tobacco sector companies listed in KSE from 2004 to 2007. They concluded that securities are not fairly priced as demanded by the model. Moreover, beta varied among different time periods. They further added that monthly risk return relationship forecast of CAPM was much stronger than that of weekly based relationship because weekly observation beta was much higher than monthly observation one. Hanif and Bhatti (2010) also concluded results in contradiction of the CAPM. The study covered institutional framework of Pakistan from 2003 to 2008. Results concluded that CAPM does not give accurate risk return relationship in Pakistani institutional framework. Furthermore, Javid (2009) investigated the accuracy of mean variance CAPM of Sharpe and Lintner on fifty individual stocks from 1993 to 2004. The findings refuted the standard CAPM as an asset valuation model in Pakistan. Javid and Ahmad (2008) tested standard CAPM and Fama French Three Factor Model in unconditional and conditional setting in Pakistan. They applied Fama and MacBeth (1973) methodology on a sample of 49 companies listed in KSE covering period from 1993 to 2004. The empirical findings contradicted the risk return relationship as predicted by standard CAPM, implied that the residual risk had significant effect on security prices. Moreover, the conditional tests, which accommodate business cycle factors of the model, performed better than unconditional ones. Similarly, Iqbal and Brooks (2007) rejected the CAPM model in Karachi stock market by concluding non-linear risk and return relationship, more profoundly in periods of outstanding performance of market in terms of liquidity and trading activity.

2.3 Tests of Conditional CAPM on International Equity Market

Pettengill et al. (1995) proposed a new approach to test conditional risk return relationship by studying NYSE. They observed 280 negative market excess returns out of total 660. Therefore, they decided to divide the sample period in up and down market. Pettengill et al. (1995) used CRSP equally weighted Index and 3 months T-bill rate as proxy to market portfolio and risk free rate of return. They modified Fama and MacBeth (1973) three-step methodology by applying the test separately for the up and down market periods. The empirical results confirmed that beta and expected return are positively related when the realized market excess return is positive. However, a negative relationship is found when the realized market excess return is negative. The study also bolstered an overall positive risk return trade-off.

Numerous scholars examined applicability of conditional CAPM using Pettengill et al. (1995) methodology. One of them, Zhang and Wihlborg (2010), conducted study to analyze the risk-return relationship in six emerging capital markets of Cyprus, Czech Republic, Greece, Hungary, Poland, Russia, and Turkey from 1996 to 2006. The conventional and conditional CAPM were tested separately by employing Fama and MacBeth (1973) and the Pettengill et al. (1995) methodology respectively. The findings concluded that CAPM performs well when the market is distinguished as up and down market. They concluded that beta is a useful measure of risk and cost of capital for individual securities. Similarly, Ozturk (2009) evinced a conditional CAPM that is dependent on the occurrence of up and down market. The sample comprised of 86 actively traded stocks of Istanbul Stock Exchange (ISE) -100 Index for which monthly returns, adjusted for dividends and equity offerings were collected over the period of January 1998 to June 2008. ISE-100 Index and weighted average of one month time deposits served as proxy to market portfolio and risk free asset. Moreover, he found that CAPM

statistically holds in period of up market. In the same market, Gursoy and Rejepova (2007) discovered significant relationship between beta coefficients and returns using Pettengill et al. (1995) approach. Similarly, Hung et al. (2004) also used pettengill et al. (1995) methodology to examine the variables, which affect the stock returns in UK stock market from 1975 to 2000. Contrary to previous work in UK, they concluded significant risk-return relationship in portfolios when the market risk is separated to allocate a negative realized risk premium to the bear markets and positive realized risk premium to the bull markets. Moreover, beta was also found significant when the methodology was applied to Fama French model. Shakrani and Ismail (2003) conducted test on 116 Islamic Unit Trust of Malaysia by taking a period of three years from 1999 to 2001. One month Interbank Rate used as the risk free rate and Shariyah Index proxied the market portfolio. They argued that unconditional CAPM shows a flat relationship between risk and risk premium. On the other hand, statistically significant risk return relationship was evinced in conditional settings.

The emerging markets have fascinated a great number of international investors through its abnormal returns and portfolio diversification prospects (Harvey, 1995). Consequently, the persistence of consistent cross sectional return behavior is of particular interest (Theriou et al., 2010). However, studies on these equity markets presented weak or no credence to meaningful risk-return relationship due to the persistence of negative market excess returns (Zhang and Wihlborg, 2010). Therefore, this study proposes a new asset-pricing model by combining Fama and MacBeth (1973) and Pettengill et al. (1995) asset-pricing models.

3. Hypotheses

Following hypotheses are established for testing by using estimated parameters.

H_1: The basic capital asset pricing model is valid in Pakistani Equity Market.

H_2: The asset pricing model conditional on up and down market is valid in Pakistani Equity Market.

4. Empirical Test Method

4.1 Basic Capital Asset Pricing Model (CAPM)

The empirical test of basic asset pricing model usually follows Fama and MacBeth (1973) regression method. The first step constitutes the estimation of beta coefficient through time series regression of realized excess return on stocks against the realized market excess returns using the following specification.

$$(R_{xt} - R_{ft}) = \hat{\alpha} + \widehat{\beta_x}\left(R_{mt} - R_{ft}\right) + \varepsilon_x \qquad (2)$$

Where R_{xt} is the realized return on any security "x" at time "t", R_{ft} is the realized risk free rate of return at time "t", R_{mt} is the realized return on market portfolio at time "t", $\widehat{\beta_x}$ is the estimated measure of systematic risk of any security "x", and ε_x is the *iid* random error term.

The second step comprises of month-on-month cross-sectional regression of monthly excess returns on all sample securities on three explanatory variables including systematic risk (β_x), quadratic term of systematic risk (β_x^2) and non-beta risk $\sigma^2{}_{(\varepsilon_x)}$. Worth mentioning that β_x is a measure of systematic risk, β_x^2 is the variable added to check if the risk-return relationship is linear, and $\sigma^2{}_{(\varepsilon_x)}$ is the variance of residuals of time series regression added to test if beta is the only adequate predictor of returns. In order to certain the linearity of relationship between beta and risk the average of its coefficient must be equal to zero. Moreover, the variation of expected returns across the securities is attributed to difference in their betas. If the coefficient of non-beta risk equals to zero, it would be proved that no other factor other than beta determines the return. The following specification is as under.

$$(R_{xt} - R_{ft}^*) = \widehat{\gamma_{0t}} + \widehat{\gamma_{1t}}\beta_x + \widehat{\gamma_{2t}}\beta_x^2 + \widehat{\gamma_{3t}}\sigma^2{}_{(\varepsilon_x)} + \varepsilon_{xt} \qquad (3)$$

Where R_{xt} is the realized return on any security "x" at time "t", R_{ft} is the realized risk free rate of return at time "t", $\widehat{\gamma_{1t}}$ is the estimated market excess return at time "t", $\widehat{\gamma_{2t}}$ is the estimated coefficient of quadratic term at time "t", $\widehat{\gamma_{3t}}$ is the estimated coefficient of non-beta risk at time "t", and ε_x is the *iid* random error term.

Finally, time series averages of the estimated cross-sectional coefficients are calculated and tested for being significantly different from zero using independent sample t-test, which will be used to prove the hypothesis regarding basic asset pricing model. To be consistent with predictions of basic CAPM following conditions must be satisfied:

1. $\overline{\widehat{\gamma_{0t}}} = \overline{\widehat{\gamma_{2t}}} = \overline{\widehat{\gamma_{3t}}} = 0$.
2. $\overline{\widehat{\gamma_{1t}}} > 0$ or the average of all the estimated market excess returns should be greater than zero and statistically significant.

4.2 Asset Pricing Model Conditional on Up and Down Market

A new model derived through the combination of Fama and MacBeth (1973) and Pettengill et al. (1995) method to empirically test the asset pricing model conditional on up and down market. The step one is identical to Fama and MacBeth (1973) method. Although the second step is altered with the addition of two variables: quadratic

term of beta (β_x^2) and non-beta risk $\sigma^2{}_{(\varepsilon_x)}$ separately for up and down markets.

The cross-sectional regression is run month-on-month basis and coefficients are estimated. The monthly excess returns on all sample securities are regressed on explanatory variables of systematic risk (β_x), quadratic term of systematic risk (β_x^2) and non-beta risk $\sigma^2{}_{(\varepsilon_x)}$ of up and down markets. The following specification is carried out.

$$(R_{xt} - R_{ft}) = \widehat{\lambda_{0t}} + \widehat{\lambda_{1t}}\delta\beta_x + \widehat{\lambda_{2t}}(1-\delta)\beta_x + \widehat{\lambda_{3t}}\delta\beta_x^2 + \widehat{\lambda_{4t}}(1-\delta)\beta_x^2 + \widehat{\lambda_{5t}}\delta\sigma^2{}_{(\varepsilon_x)} + \widehat{\lambda_{6t}}(1-\delta)\sigma^2{}_{(\varepsilon_x)} + \varepsilon_{xt} \quad (4)$$

Where R_{xt} is the realized return on any security "x" at time "t", R_{ft} is the realized risk free rate of return at time "t", δ is the dummy variable equals to 1 when the market is up $(R_{mt} - R_{ft}) > 0$ and equals to 0 when the market is down $(R_{mt} - R_{ft}) < 0$, $\widehat{\lambda_{1t}}$ is estimated market excess return for up market, $\widehat{\lambda_{2t}}$ is estimated market excess return for down market, $\widehat{\gamma_{3t}}$and $\widehat{\gamma_{4t}}$ are estimated coefficients of quadratic term for up and down market respectively, $\widehat{\gamma_{5t}}$ and $\widehat{\gamma_{6t}}$ are estimated coefficients of non-beta risk for up and down market respectively, and ε_x is the *iid* random error term. Finally, time series averages of the estimated cross-sectional coefficients are calculated and tested for being significantly different from zero using independent sample t-test, which will be used to prove the hypothesis regarding asset pricing model conditional on up and down market.

To validate the asset pricing model conditional on up and down market following conditions need to be satisfied:

1. $\overline{\widehat{\lambda_{0t}}} = \overline{\widehat{\lambda_{3t}}} = \overline{\widehat{\lambda_{4t}}} = \overline{\widehat{\lambda_{5t}}} = \overline{\widehat{\lambda_{6t}}} = 0$.
2. $\overline{\widehat{\lambda_{1t}}} > 0$ or the average market excess return for up market should be greater than zero and statistically significant.
3. $\overline{\widehat{\lambda_{2t}}} < 0$ or the average market excess return for down market should be less than zero and statistically significant.
4. There should be overall Positive risk-return tradeoff.

The positive risk-return trade-off means that, on average, the investor would be rewarded return for bearing beta risk by holding security; for instance, on average, high beta stocks will reward higher returns than low beta socks.

Pettengill et al. (1995) claimed that given the systematic risk-return relationship, there must be overall positive risk-return trade-off. They suggested that to prove overall positive risk-return relationship the estimated market excess returns of up and down markets should be symmetrical. Two-population t-test is used to compare the average market excess return of up and down market. To preserve the effect of slopes, while comparing the two means, the sign for negative values in both up and down period market excess returns are reciprocated and averages are re-estimated. To prove symmetry between market excess returns of up and down markets the condition $\overline{\widehat{\lambda_{1t}}} - \overline{\widehat{\lambda_{2t}}} \neq 0$ must be satisfied and statistically significant.

4.3 Econometric Techniques

The data analysis is carried out using Ordinary Least Square (OLS) regression technique in statistical software econometric views (E-views 6). Worth noting, The stock return series involve the problems of heteroskedasticity and serial correlation. The heteroskedasticity problem identified through White Heteroskedasticity Test, wherever found, is resolved by enabling the White Heteroskedasticity-Consistent Standard Errors & Covariance during regression procedure. Moreover, the serial correlation in error terms is identified through Breusch-Godfrey Serial Correlation Lagrange Multiplier Test. Where necessary; the appropriate number of ARMA (Auto Regressive Moving Average) terms is added to address the issue.

5. Data Collection and Modifications

The study covers a period of eight years from July 2004 to December 2012. The sample period is divided into two sub-periods (1) Beta Estimation Period (July 2004 to June 2008) (2) Model Testing Period (Jan 2009 to Dec 2012). The sample consists of a purposive sample of 30 stocks drawn from a population of 375 companies listed in Karachi Stock Exchange. The selection followed a bi-fold criteria (1) continuous listing of companies and (2) active trading of stocks, over the sample periods. The KSE-100 Share Index serves as proxy for Market portfolio. Besides, risk free rate is proxied by return on three months T-bill rate adjusted for inflation. The monthly closing prices of securities and KSE-100 share Index are obtained from Karachi Stock Exchange. Whereas, the data on T-bill and CPI inflation are gathered from the Monthly Bulletin and Inflation Monitor Reports of State Bank of Pakistan.

The stock price series usually possess non-stationarity, which is eliminated by calculating the return series of stock price series and KSE-100 Share Index points series using commonly known procedure of "natural log approximation formula". These logarithmic returns are also known as continuously compounded return. They are mostly normally distributed and fit in the assumptions of the standard statistical techniques (Strong, 1992).

$$R_{x,t} = \ln P_{x,t} - \ln P_{x,t-1} \quad (5)$$

Where, $R_{x,t}$ is the return on any security "x" at time "t", $P_{x,t}$ is the closing price of security "x" at time "t", and $P_{x,t-1}$ is the closing price of security "x" at time "t-1".

Many developing countries, including Pakistan, are inflation victims. In such countries the real returns are much lower than the nominal returns, which result in estimation biases (Zhang and Wihlborg, 2010). In order avoid bias due to high nominal T-bill rates, the real return on T-bill is calculated by using Fisher's Equation following Chen et al. (1986). This real return on T-bill will serve as proxy to risk free rate of return in model testing. The specification is as under:

$$R_f^* = \frac{(1+R_f)}{(1+A(I))} - 1 \qquad (6)$$

Where, R_f^* is the real risk free rate of return, R_f is the nominal risk free rate of return, and $A(I)$ is the actual inflation.

The market excess returns are also likely to be upward bias in high inflation (interest rate) economies (Zhang and Wihlborg, 2010). To avoid this error the adjusted market excess return series are calculated by dividing market excess return by 1 plus real risk free rate of return following Zhang and Wihlborg (2010). The specification is as follows:

$$Adj\ MER = \frac{(1+MER)}{(1+R_f^*)} \qquad (7)$$

Where, R_f^* is the real risk free rate of return, MER is the market excess return, and $Adj\ MER$ is the adjusted market excess return.

6. Findings

6.1 Descriptive Statistics

Table 1 presents the average nominal and real return on KSE-100 share index, three months T-bill and CPI inflation. By observing the values we can say that though nominal returns higher, but the real returns are much lower due to the adverse effect of inflation on nominal interest rates in Pakistan.

Table 1: Average Return on KSE-100 Share Index, Three Months T-Bill And CPI Inflation

Averages					
Periods	**KSE-100 Share Index**		**Three Month T-bill Rate**		**CPI Inflation**
	Nominal	**Real**	**Nominal**	**Real**	--------
Sub-Period I	0.015	-0.071	0.076	-0.014	0.092
Sub-Period II	0.024	-0.087	0.122	-0.001	0.124
Source: Author's Calculation					

The descriptive statistics for the monthly ex-post market excess return for overall 96 months of sample period and for distinguished positive/negative periods are reported in table 2. The statistics reveal that the average ex-post market excess return for the up market is 6.2 percent and for down market is -4.6 percent. This shows that the ex-post risk-relationship is conditional on the sign of market excess return. Moreover, the market excess return for all the 96 months is positive and equals 2.7 percent. The table also reports that the average negative ex-post market excess return occurred about 32.29 percent of the period. The presence of such a huge portion of negative market excess return provides a indication of the persistence of conditional relationship between beta and ex-post return and thus conditional asset pricing model may be suitable for the prediction of returns on risky securities in KSE. It can be noted that all the averages are significantly different from zero at 1 percent level.

Table 2: Descriptive Statistics For Monthly Ex-Post Market Excess Return

	Positive	**Negative**	**Total**
Observations Count	65	31	96
Percentage	67.71	32.29	100.00
Mean	0.062	-0.046	0.027
Std. Deviation	0.047	0.044	0.068
t-stats.	10.754	-5.824	3.941
P-Value	0.000	0.000	0.000
Source: Author's Calculation			

6.2 Regression Results

Basic Capital Asset Pricing Model (CAPM)

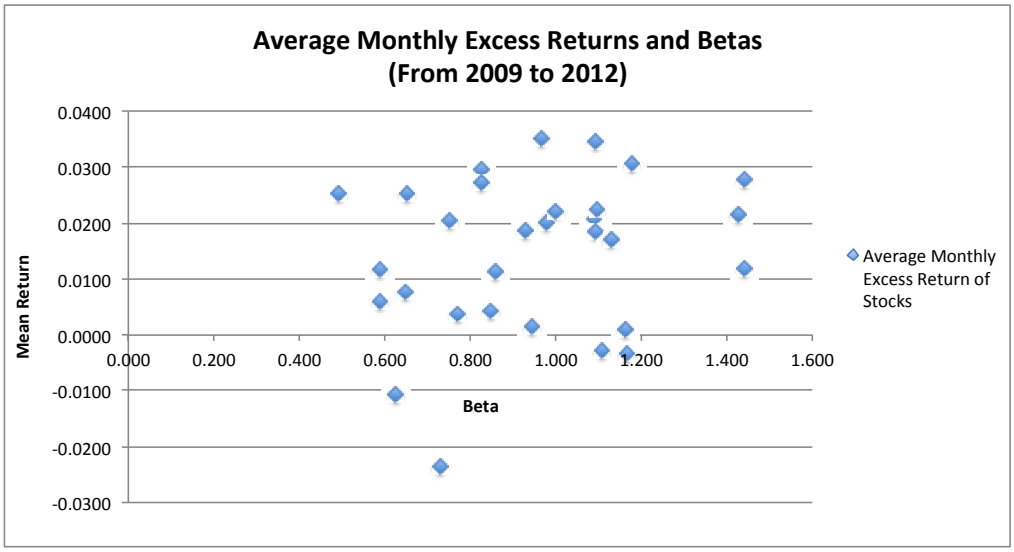
Prior researchers tested the basic capital asset pricing model using Fama and MacBeth (1973) method. Following the literature, the study also tests basic CAPM to aid comparison. As per initial part of the methodology the beta coefficients are estimated for individual securities for the sub-period I, presented in table 3.

Table 3: Estimates of the Measure of Systematic Risk (Beta)

Stocks	Beta	t-Stats.	Prob.	R^2	F-statistic	Prob.
HUBC	0.491	2.915	0.006	0.269	16.932	0.000
BAHL	0.589	4.362	0.000	0.293	19.025	0.000
ENGRO	0.590	6.977	0.000	0.514	48.685	0.000
AHCL	0.627	3.010	0.004	0.165	9.058	0.004
FCCL	0.647	6.465	0.000	0.476	41.801	0.000
FFC	0.652	6.536	0.000	0.482	42.721	0.000
JSCL	0.730	3.637	0.001	0.163	4.286	0.020
ABOT	0.751	4.316	0.000	0.288	18.625	0.000
PIAA	0.770	3.503	0.001	0.211	12.270	0.001
FFBL	0.826	5.431	0.000	0.391	29.494	0.000
MLCF	0.826	4.451	0.000	0.301	19.810	0.000
ACBL	0.848	5.709	0.000	0.415	32.587	0.000
PSO	0.858	7.808	0.000	0.570	60.959	0.000
NRL	0.928	5.533	0.000	0.400	30.614	0.000
PTC	0.943	6.236	0.000	0.458	38.887	0.000
POL	0.968	6.623	0.000	0.488	43.859	0.000
ICI	0.977	6.401	0.000	0.471	40.978	0.000
KESC	1.001	4.045	0.000	0.281	17.943	0.000
DGCK	1.088	8.106	0.000	0.588	65.704	0.000
NML	1.091	7.450	0.000	0.675	95.663	0.000
LUCK	1.092	6.663	0.000	0.441	36.264	0.000
ATRL	1.096	3.958	0.000	0.254	15.666	0.000
AICL	1.108	5.377	0.000	0.386	28.913	0.000
MCB	1.128	5.848	0.000	0.566	60.071	0.000
BAFL	1.163	6.506	0.000	0.479	42.323	0.000
BOP	1.165	5.889	0.000	0.491	44.427	0.000
OGDC	1.179	7.004	0.000	0.768	152.299	0.000
PPL	1.427	7.605	0.000	0.557	57.838	0.000
NCL	1.440	5.775	0.000	0.420	33.352	0.000
NBP	1.442	11.020	0.000	0.725	121.440	0.000
Source: Author's Calculation						

When these betas are plotted with the returns of respective stocks on a scattered diagram, we observe that stocks with higher beta risk do not certainly produce higher returns. The relationship is depicted in figure 1. These results are not just enough to invalidate the applicability of standard CAPM in Pakistan. It is essential to estimate the counterpart values of coefficients by regressing the equation 3 to test the basic CAPM.

Fig. 1: Average Ex-Post Monthly Excess Return and Beta of Stocks



The results of estimated coefficients of basic CAPM are presented in table 4.

Table 4: Average Estimated Coefficients of Basic CAPM

Variables	$\overline{\widehat{\gamma_{0t}}}$	$\overline{\widehat{\gamma_{1t}}}$	$\overline{\widehat{\gamma_{2t}}}$	$\overline{\widehat{\gamma_{3t}}}$
Average	-0.0108	0.0492	-0.0179	-0.5196
Std. Deviation	0.2653	0.5658	0.2933	6.8703
t –Stats.	-0.2829	0.6020	-0.4235	-0.5240
Prob.	0.7785	0.2750	0.6738	0.6028
Source: Author's Calculation				

The CAPM assumes that the intercept term should be zero for each stock. The average estimated value of the intercept (-0.0108) is not significantly different from zero (t = -0.2829), consistent with CAPM. The average estimated market excess return ($\overline{\widehat{\gamma_{1t}}}$) is 0.0492. One tailed t-test is conducted to test the condition $\overline{\widehat{\gamma_{1t}}} > 0$. The results show that $\overline{\widehat{\gamma_{1t}}}$ is not different from zero (t = 0.6020), which invalidates the assumption CAPM. On the other hand, the average estimated coefficient of beta-square ($\overline{\widehat{\gamma_{2t}}}$ = -0.0179) is very small and not statistically different from zero (t = -0.4235). It is therefore safe to conclude that the risk-return relationship is linear. Finally, the average estimated coefficient of non-beta risk $\overline{\widehat{\gamma_{3t}}}$ (-0.5196) is also not statistically different from zero (t = -0.5240). This proves that the residual or non-beta risk has no effect on the expected return of stocks. . This incompetence is might be the resultant of undiversified portfolios, inefficient market, and short study period. Our results are consistent with Dzaja and Aljinovic (2013), Basu and Chawla (2010) Choudhary and Choudhary (2010), Nikolaos (2009), Michailidis et al. (2006), Groenewold and Fraser (1997), Tinic and West (1984) from other countries and Rizwan et al. (2013), Khan et al. (2012), Zubairi and Farooq (2011), Hanif (2010), Hanif and Bhatti (2010), Javid (2009), Javid and Ahmad (2008), and Iqbal and Brooks (2007) from Pakistan. The findings contradict Osamwonyi and Asein (2012), Fama and MacBeth (1973), and Raza et al. (2011).

Asset Pricing Model Conditional on Up and Down Market

Table 5 exhibits the results of empirical test of new asset pricing model conditional on up and down market, derived by the study.

Table 5: Average Estimated Coefficients of Asset Pricing Model Conditional on Up And Down Market

Up Market				
Variables	$\overline{\widehat{\lambda_{0t}}}$	$\overline{\widehat{\lambda_{1t}}}$	$\overline{\widehat{\lambda_{3t}}}$	$\overline{\widehat{\lambda_{5t}}}$
Average	-0.0229	0.1274	-0.0570	0.8875
Std. Deviation	0.2308	0.5263	0.2754	6.3922
t –Stats.	-0.5706	1.3904	-1.1895	0.7976
Prob.	0.5722	0.0869	0.2430	0.4310
Down Market				
Variables	$\overline{\widehat{\lambda_{0t}}}$	$\overline{\widehat{\lambda_{2t}}}$	$\overline{\widehat{\lambda_{4t}}}$	$\overline{\widehat{\lambda_{6t}}}$
Average	0.0158	-0.1229	0.0681	-3.6152
Std. Deviation	0.3369	0.6289	0.3225	7.0806
t –Stats.	0.1813	-0.7570	0.8174	-1.9775
Prob.	0.8587	0.2308	0.4274	0.0680
Symmetry of Market Excess Returns of Up and Down Markets				
t –Stats.	0.0217	**Prob.**		0.9828
Source: Author's Calculation				

Likewise the unconditional test, the average estimated intercept $\overline{\widehat{\lambda_{0t}}}$ in up market (-0.0229) and down market (0.0158) are not significantly different from zero, consistent with CAPM.

Furthermore, in up market periods, we find a significant positive risk-return relationship. The average estimated market excess return of up market (0.1274) is statistically greater than zero at 10 percent level. Results show that the average estimated coefficient of beta-square ($\overline{\widehat{\lambda_{3t}}}$ = -0.0570) is very small and not statistically different from zero (t = -1.1895). Hence, the risk-return relationship appears to be linear in up market. The average estimated coefficient of non-beta risk ($\overline{\widehat{\lambda_{5t}}}$ = 0.8875) is also not statistically different from zero (t = 0.7976). Thus we can consider beta as the only determinant of return in periods of up market. Overall analysis of up market period provides evidence in favor of conditional asset pricing model. However, the results of down market periods are not consistent with conditional model. The average estimated market excess return of down market ($\overline{\widehat{\lambda_{2t}}}$= -0.1229) is not found statistically lower than zero (t = -0.7570), which contradicts the prediction of

conditional asset pricing model. The average estimated coefficient of beta-square ($\overline{\widehat{\lambda_{4t}}}$ = 0.0681) is not statistically different from zero (t = 0.8174), proving linearity of the risk-return relationship. Although the average estimated coefficient of non-beta risk ($\overline{\widehat{\lambda_{6t}}}$ = -3.6152), is statistically different from zero at 10 percent level. This provides an evidence of the impact of residual risk in determination of expected returns in down market periods. We argue that the proven impact of non-beta risk contributes to the inconsistent estimated average market excess return in down market periods These findings can be augmented with the high economic recession, political instability and deteriorated law and order situation in the country (Akbar et al., 2012). Therefore, the results of down market are not in favor of conditional asset pricing model. The findings are consistent with Ozturk (2009) but inconsistent with Zhang and Wihlborg (2010), Gursoy and Rejepova (2007), Hung et al. (2004), and Shakrani and Ismail (2003).

The examination of results regarding symmetry helps us conclude that the estimated market excess returns of up and down market periods are not symmetrical since the null hypothesis H_0: $\widehat{\lambda_{1t}} - \widehat{\lambda_{2t}} = 0$ cannot be rejected. (t = 0.0217). Overall analysis does not provide evidence in favor of positive risk-return trade-off; results are consistent with Sandoval and Saens (2004).

7. Interpretation of results

Basic Capital Asset Pricing Model (CAPM)

Based on the results, the null hypothesis regarding non-validation of basic capital asset pricing model in Pakistani Equity Market cannot be rejected The findings regarding first hypothesis are concluded in table 6.

Table 6: Findings Regarding Hypothesis 1

Hypothesis 1	Condition	Test	Status	Result
H_0: The basic capital asset pricing model is invalid in Pakistani Equity Market.	$\overline{\widehat{\gamma_{0t}}} = 0$	Two-tailed Independent Sample T-test	Proved	**H_0: Not rejected**
	$\overline{\widehat{\gamma_{1t}}} > 0$	One-tailed Independent Sample T-test	Not Proved	
H_1: The basic capital asset pricing model is valid in Pakistani Equity Market.	$\overline{\widehat{\gamma_{2t}}} = 0$	Two-tailed Independent Sample T-test	Proved	**H_1: Cannot be Accepted**
	$\overline{\widehat{\gamma_{3t}}} = 0$	Two-tailed Independent Sample T-test	Proved	
Source: Author's Calculation				

Asset Pricing Model Conditional on Up and Down Market

The findings partially support the validity of asset pricing model conditional on up and down market in case of KSE for the sample period under consideration. Hence, the hypothesis of conditional asset pricing model is partially proved and thus partially accepted by rejecting the null hypothesis. The results of second hypothesis are concluded in table 7.

Table 7: Findings Regarding Hypothesis 2

Hypothesis 2	Condition	Test	Status	Result
H_0: The asset pricing model conditional on up and down market is invalid in Pakistani Equity Market.	$\overline{\widehat{\lambda_{0t}}} = 0$	Two-tailed Independent Sample T-test	Proved	**H_0: Rejected**
	$\overline{\widehat{\lambda_{1t}}} > 0$	One-tailed Independent Sample T-test	Proved	
	$\overline{\widehat{\lambda_{2t}}} < 0$	One-tailed Independent Sample T-test	Not Proved	
	$\overline{\widehat{\lambda_{3t}}} = 0$	Two-tailed Independent Sample T-test	Proved	
H_2: The asset pricing model conditional on up and down market is valid in Pakistani Equity Market.	$\overline{\widehat{\lambda_{4t}}} = 0$	Two-tailed Independent Sample T-test	Proved	**H_2: Partially Accepted**
	$\overline{\widehat{\lambda_{5t}}} = 0$	Two-tailed Independent Sample T-test	Proved	
	$\overline{\widehat{\lambda_{6t}}} = 0$	Two-tailed Independent Sample T-test	Not Proved	
	$\widehat{\lambda_{1t}} - \widehat{\lambda_{2t}} \neq 0$	Two Population T-test	Not Proved	
Source: Author's Calculation				

8. Conclusion

This research study proposes a new asset pricing model conditional on up and down market and tests its applicability in emerging market of Pakistan. For the said purpose, the model is tested after segregating the market on the basis of sign of monthly ex-post market excess returns. Without segregation of periods, the basic capital asset pricing model is insufficient to predict the returns in emerging markets attributed with higher volatility and frequent negative market excess returns. The conditional asset pricing model outperforms the unconditional model in up markets, since a significant positive risk-return trade-off is found and no factor other than beta determines the returns. However, in down markets the risk-return relationship in not negative and residual risk tends to affect the returns. Moreover, the market excess returns of up and down markets are also found asymmetric.

Given that this study provides a basis for concluding that beta is insufficient determinant of returns in down market periods, other macroeconomic variables can be included in the test of asset pricing model conditional on up and down market. Further avenue for research may also include studying a large sphere of emerging markets of Asia using sophisticated econometric tools.

The practical implication of the research is that that beta can be an adequate predictor of individual stock's return solely in up markets. It is therefore suggested to the current and prospective investors, portfolio managers and finance managers of firms consider this phenomenon in their estimations of beta and returns.

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Appendix

Table A1: List of Companies Selected

Symbol	Name	Sector
ABOT	Abbott Laboratories (Pakistan) Ltd.	Pharma and Bio Tech
AICL	Adamjee Insurance Co. Ltd.	Non-Life Insurance
AHCL	Arif Habib Corporation Ltd.	Chemicals
ACBL	Askari Commercial Bank Ltd.	Commercial Banks
ATRL	Attock Refinery Ltd.	Oil and Gas
BAFL	Bank Alfalah Ltd.	Commercial Banks
BAHL	Bank AL-Habib Ltd.	Commercial Banks
BOP	Bank of Punjab	Commercial Banks
DGKC	D. G. Khan Cement Co. Ltd.	Construction and Materials (Cement)
ENGRO	Engro Corporation (Pak) Ltd.	Chemicals
FFBL	Fauji Fertilizer Bin Qasim	Chemicals
FCCL	Fauji Cement Company Ltd.	Construction and Materials (Cement)
FFC	Fauji Fertilizer Company Ltd.	Chemicals
HUBC	Hub Power Company Ltd.	Electricity
ICI	ICI Pakistan Ltd.	Chemicals
JSCL	Jahangir Siddiqui and Company Ltd.	Financial Services
KESC	Karachi Electric Supply Corp.	Electricity
LUCK	Lucky Cement Ltd.	Construction and Materials (Cement)
MCB	MCB Bank Limited	Commercial Banks
MLCF	Maple Leaf Cement Factory Ltd.	Construction and Materials (Cement)
NBP	National Bank of Pakistan Ltd.	Commercial Banks
NCL	Nishat (Chunian) Ltd.	Personal Goods (Textile)
NML	Nishat Mills Ltd.	Personal Goods (Textile)
NRL	National Refinery Ltd.	Oil and Gas
OGDC	Oil & Gas Development Co.	Oil and Gas
PIAA	Pakistan International Airlines Corp.	Travel and Leisure
POL	Pakistan Oilfields Ltd.	Oil and Gas
PPL	Pak Petroleum Ltd.	Oil and Gas
PSO	Pakistan State Oil Co. Ltd.	Oil and Gas
PTC	Pakistan Telecommunication Ltd.	Fixed Line Telecommunication

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