IMPACT OF INVESTOR SENTIMENTS ON EQUITY RETURNS: EMPIRICAL EVIDENCE FROM PAKISTAN

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FORWARDING SHEET

The thesis entitled "Impact of Investor Sentiments on Equity Returns: Empirical evidence from Pakistan " submitted by Najam Us Sahar in partial fulfillment of M.Phil degree in Management with specialization in Finance has been completed under my guidance and supervision. I am satisfied with the quality of student's research work and allow her to submit this thesis for further process of as per IIU rules & regulations.

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DEDICATION

Dedicated to ***Ziker of Allah***
Which give me happiness and peace more than
Any thing in the world.

ABSTRACT

This study examines the relationship between Market, Value, Size and Investor Sentiment premium and stock returns empirically. Different patterns in asset prices and returns are recognized theoretically and empirically in Finance research history, in terms of both fundamental and behavioral aspects. Secondary data of 73 companies was taken from KSE-100 index companies for the period of 2001-2007 on monthly basis. This study examines CAPM and Fama & French (1993) three factor model with incorporation of an additional factor of Investor Sentiments. The objective has been achieved by taking difference between high turnover and low turn over stocks as Proxy for Investor Sentiments. The results show that Fama & French three factor model adequately explains Pakistani stock market returns. Although Investor Sentiments is insignificant in both models but cannot be over rightly negated as it works in stylized portfolio settings of, small sized stocks which have high B/E ratio with high liquidity(S/H/U), small sized stocks which have high book B/E ratio with low liquidity (S/H/D) and small sized stocks which have low B/E ratio with low liquidity (S/L/D). These results are useful in taking decisions regarding investment, valuation, capital budgeting and cost of financing for financial decision makers and fund managers.

Keywords: Investor Sentiments, Asset Pricing, CAPM, Fama & French Three Factor model.

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DECLARATION

I hereby declare that this thesis, neither as a whole nor as a part thereof, has been copied out from any source. It is further declared that I have prepared this thesis entirely on the basis of my personal effort made under the sincere guidenance of my supervisor.

No portion of the work, presented in this thesis, has been submitted in support of any application for any degree or qualification of this or any other university or institute of learning.

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ABBREVIATIONS

BSI:	Buy-sell Imbalance
CCI:	consumer Confidence Index
CAPM:	Capital Asset Pricing Model
FF:	Fama and French
HML:	High minus Low
IS:	Investor Sentiments
KSE:	Karachi Stock Exchange
SMB:	Small minus Big
WACC:	Weighted Average Cost of Capital

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Different patterns in asset prices and returns are recognized theoretically and empirically in Finance research history. Open markets and easily accessible data on stock market due to technological advances is also playing role in huge number of empirical studies to test the patterns in the secondary markets. The models and theories proposed by the scholars in the field of asset pricing are verified empirically as the investment in this market is huge and have great impact on the economy, and these verifications in turn affect the market and enlargement of new models in the field of asset pricing.

Markowitz in 1952 first explained the relationship of expected returns and risk and the idea of portfolio selection which explains that "there is a rate at which the investor can gain expected return by taking on variance, or reduce variance by giving up expected return". He explained that the standard deviation of assets, which are not perfectly positively correlated in a set of investor's portfolio, is always less than there additive sum.

Sharp (1964), Lintner (1965) and Black (1972), proposed a new model named as CAPM (Capital Asset Pricing Model) that served as most popular and applicable model for about half century, which calculates the cross section of asset returns in any portfolio by its Beta. CAPM is based on many assumptions, which are, efficient market, equal information and expectations regarding security, investors desiring lower risk and higher

returns etc. With the passage of time many variation in CAPM were introduced for efficiency in calculating the required rate of return like conditional models, single factor (Standard CAPM) and Multi factor models.

CAPM was not supported empirically in many economies which made path of new factor discovery like firm size (Banz, 1981), earnings yield (Basu, 1983), leverage (Bhandari, 1988), and firm's book-to-market-equity (BE/ME) ratio (Stattman 1980, Rosenberg, Reid, and Lanstein 1985, Chan et al., 1991), which better explains the movements of security returns. By identification of these factors there came an era of developing models of multiple factors.

Fama and French (1992 and 1993) criticized CAPM and added two new factors of size and book-to-market equity to the traditional CAPM and introduced these two factors as proxies for risk loading. Market capitalization or size was attributed as significant explanatory variable by many practitioners and scholars in cross section of average returns in asset's valuation like Banz (1981) and Sehgal (1997). Size premium theory says that firms with high market capitalization offer fewer premiums than small capitalized firms. Market value or HML is explained as extra premium offered by higher book to market value ratio firms against lower ones. As higher ratio means that market is not giving the assets its book worth. So value securities are more risky. This effect was examined by Chan et al. (1991).

Some researchers also attributed changes in average returns to behavioral factors like noise trading (Kyle 1985; Black 1986), overreaction, under reaction (Lakonishok, Shleifer & Vishny. 1994, Barberis et al. 1998, Daniel et al.1997), investor sentiments (De Long et al. 1990; Siegel, 1992, Barberis et al., 1998) etc.

De Long, Shleifer, Summers and Waldmann (1990), remarkable work of theoretically proving the sentiment effect opened up new venues of research to the scholars of asset pricing. Since then large number of studies are devoted to integrate this factor as variable in asset pricing models. By empirical measures and proxies investor sentiments are being quantified and used in CAPM and other models like Fama and French three factor as single factor of market is considered inadequate as an accord in the debates of academicians and research intellectuals to explain the returns pattern of risky assets (Miller, 1999).

Pastor and Stambaugh (2003) assembled liquidity in the return model by taking difference between portfolios having measures of high and low liquidity (turnover). Baker and Stein (2004) presented this liquidity factor as indirect measure of IS (Investor Sentiments

This research will fill the gap and provide basis for the research on the behavioral aspects of Pakistani financial market with regular steps of CAPM to Fama French then incorporation of sentiments.

1.2 SIGNIFICANCE OF THE STUDY

A large number of studies have been devoted to the estimation of systematic risk, i.e. beta, since the Capital Asset Pricing Model (CAPM) of Sharpe (1964), Lintner (1965) and Black (1972) was introduced for the first time. However, the empirical evidence to date on the CAPM prediction has been inconclusive. The literature on CAPM tests has documented at the same time a number of CAPM anomalies like size, earning/ price, cash flow/ price, book to market equity, past sales growth, long term past returns and short term past return etc which shows evidently that beta is not sufficient to explain the non diversifiable risk. There is non agreement on noise trading and mispricing that brings systematic elements because of intricacy involved in empirically establishing the phenomenon. By constructing general equilibrium models the relevant measure of risk can be uncovered and the relationship between expected return and risk for any asset can be determined (Elton and Gruber, 1995). Fama and French (1992, 1993) incorporated book to market equity and size to depict the asset prices. In recent past multi-factor models are developed to better explain the asset pricing. A long-running debate in financial economics concerns the possible effect of investor sentiment on asset prices, it seems natural to view sentiment as a persistent variable, people become more optimistic as they are reinforced by others joining on the bandwagon. Arbitrageurs can't take positions against these irrational moves of individual investors as its too costly and risky, which limits the activity and the irrational component itself is priced in the secondary market.

By studying the phenomenon of investor sentiments we can know about biases in the stock market forecasts of investors and also opportunities to earn extra returns by exploiting those biases. All strategic decisions of investment are related to the valuation of assets, through solving the model WACC, portfolio related decisions like diversification and allocation of resources, and other measures can be calculated accurately, so will be helpful in decision making. This research also provides good foundation for measures like performance evaluation and portfolio selection decision making.

1.3 OBJECTIVES OF THE STUDY

The objectives of this research are

- To test capital asset pricing model (CAPM) in Pakistani stock market.
- To check Fama and French Model in Pakistani stock market.
- To verify Anomalies of size, Value and Investor sentiments in Pakistani stock market.
- To propose a new four factor model that can better explain the Pakistani stock market returns.

1.4 THE EXPECTED CONTRIBUTION OF RESEARCH

This study is the primary effort on the topic of investor sentiments in Pakistan. In particular, the situation in Pakistan is characterized by the lack of an earnings history, apparently unlimited growth potential, and unsophisticated investors; hence, the role of investor sentiment should be tremendous. This research will attempt to increase the muscle of Fama and French Model by incorporating a non fundamental factor; investor sentiments in emerging market of Pakistan. Griffin (2002), explained that size and value

factors can only be explained in framework of situation and country. So, Pakistani local analysis is important for Pakistani literature and practice.

1.5 ORGANIZATION OF FOLLOWING CHAPTERS

The introduction section of the research illustrates the background, statement of the problem, rationale of the study and research objectives. Rest of the study is structured as follows.

Chapter two provides background information and an overview of this research including the literature on market factor, size factor, value factor and investor sentiments. Also the theories and practice evolution of different models that include these factors as significant for return's estimation. The proposed model is also discussed.

Research methodology of the study has been explained in chapter three, also methods of collection and the methods of processing of data employed in this research. Being quantitative nature of this research, the research design methods, survey contributors, instrumentation, processes and data analyses are explored in this chapter. Hypotheses along with integrated model are elaborated.

Chapter four discusses results and explains statistical analyses of data collected and variables constructed. It provides statistical results and findings to explore the attitudes and behaviors of Pakistani stock market in both financial and non financial firms. Detailed interpretations of the tests are also given in the chapter along with the analysis.

Chapter five provides discussion on findings, limitations of this research and conclusion derived from this research. Finally, recommendations for the use of research results and areas of possible future research are stated.

CHAPTER TWO

LITERATURE REVIEW

Classical finance theory overlooks the role of behavior and sentiments and infers investors to be rational (Gomes et al., 2003).This theory establishes on the proposition that present value of future cash flows represents the prices of assets. This phenomenon is characterized on efficient market hypothesis. If there are some non-fundamental factors like noise trading it states that activities of rational traders and arbitrageurs offset the effect and the aggregate effect follow the fundamental patterns. In contrast, optimism and pessimism can affect the market by noise trading and irrational behavior of investors and can shift the demand curve. Sentiment theory connotes that arbitrage is limited and against the classical view prices may deviate from the fundamentals. Behavioral models with effect on average returns first appeared in 1980s, which focused theoretical reasoning on constraints of arbitrage like risk ness, subjective valuation, speculative demand shocks, thin trading etc, and its effect on entire stock market. In that era scholars were concerned about variability in indices as a whole which can't be explained through classics and fundamentals, mean reversion and aggregate market behavior that are not predictable by established methods of efficient market theory. According to this view drift expectations; optimistic and pessimistic can sustain and effect on average returns for considerable time spans. According to Shliefer and Summers 1990, irrational investors and sentiments theory better explain the stock returns than efficient market theory.

Individual investing in assets always want maximum return with minimum risk and asset pricing theory associates the future returns of asset with risk associated with that returns, which is measured by the uncertain returns bandwagon expected to earn in future (Cochrane, 2001). Markowitz in 1952 brought the idea of portfolio selection which explains that "there is a rate at which the investor can gain expected return by taking on variance, or reduce variance by giving up expected return". He not only explained the variability of returns in terms of riskiness of portfolio but also the covariance of securities to consider for minimization of risk. After Markowitz's illustration of identifying sets of portfolios, two models of asset valuation developed; which are Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT).

Capital Asset Pricing Model (CAPM) developed by Sharpe (1964), Lintner (1965) and Black (1972), is a model based on many assumptions, which are, efficient market, equal information and expectations regarding security, investors desiring lower risk and higher returns etc. CAPM states that the required or expected return on an investment should be equal to the rate earned on a risk less investment plus a premium for the assumption of market risk.

Primary researches on individual security returns by Lintner 1965, and Douglas 1969, depicted somewhat insignificant results of CAPM. Black et al. (1972) did first empirical test on CAPM and found linear relationship of mean excess return and beta. He also introduced zero beta CAPM. Researchers like Merton (1973) and Breeden (1979), came with new intervention in CAPM like ICAPM and CCAMP, with continuous flow and

consumption concept respectively. Merton states that multiple risk factors are required in determining asset prices when modeling ICAPM. Gibbons in 1982 proposed a method which in chorus calculates both beta and risk premium, and eliminates step by step calculation. This theory jumbles CAPM (Dimson E. & Mussavian M, 1999). Gibbons 1989 also argues about the need of identifying mean variance efficient portfolio practically as stated by the CAPM theory. Stambaugh (1982), incorporated bonds and real estate in the market variable and proved that CAPM is not applicable.

CAPM not only contributed theoretical and econometrics insights but also developed large number of empirical financial investigations internationally (Miller 1999). Miller 1999 also point up that in thirty years after CAPM there was extensive empirical research on the model and found insignificant results of relationship between beta and stock returns (Reinganum, 1981; Breedenet et al., 1989; Fama and French, 1992), and these results demanded another model which must calculate something more than beta; the systematic risk.

Ross (1976) and Roll (1977) came up with more than one measure of systematic risk and gave Arbitrage Pricing Theory (APT). APT captures multiple factors that can influence security returns and does not need assumption of investors optimizing mean variance of returns and assume that returns are linearly related to multiple factors. APT can be viewed as an extension of CAPM (Sun & Zhang 2001). Empirical results support APT as compared to CAPM which only estimates returns through beta (Groenewold & Fraser, 1997).

Empirical failure of CAPM with only one factor; beta, resulted in exploration of many other factors like Firm size (Banz, 1981), earnings yield (Basu, 1983), leverage (Bhandari, 1988), and firm's book-to-market-equity (BE/ME) ratio (Stattman1980, Rosenberg, Reid, and Lanstein 1985, Chan et al., 1991), which better explains the movements of security returns. By identification of these factors there came an era of developing models of multiple factors and encompassing multiple time periods.

There is strand of research work regarding the insufficiency of beta to explain cross section of returns of securities and exploring different anomalies for explanation of these returns. Fama and French have there series of papers on alternative asset pricing models. Fama and French (1992 and 1993) criticized CAPM and added two new factors of size and book-to-market equity to the traditional CAPM and introduced these two factors as proxies for risk loading. In their study they wanted to test leverage as factor to predict stock returns, there results in contrast identified size and book-to-market equity as significant variables to explain security returns. As that study was intended to work for leverage, the sample firms were non-financial. Fama and French (1994) applied this phenomenon to industries. Fama and French (1995) shows that the model still gives significant results on security returns when portfolios are formed on E/P, C/P and sales growth, size(SMB) and value(HML) anomaly explains these factors. Fama and French (1996) identified the size and value portfolios on long and short position basis, and argue that these can serve as proxies for the factors that are undiscovered. Fama and French (1997) results indicate that market only or market, size and value (book-to-market equity)

models do not explain return with reliability. Fama and French (1997), test there model on 16 markets and found that stocks with small size have more returns than big ones, but their resulted betas does not amply explain stock returns in international markets. Practitioners adopted Fama and French three factor model broadly but this adaptation is too early because of mixed and confusing empirical evidences (Hawawini & Keim1999).

Barber and Lyon (1997) extended the methodology of Fama and French (1992) to financial firms and proved that size and book-to-market equity relation with security returns holds for financial firms too. They illustrate that the results of was not due to data snooping or survivorship bias. Chiao, Cheng and Hung (2005) also test the model for non financial firms and get same results. They argue that the patterns of size and value premium are same for financial and non financial firms and have similar relation to security returns.

The behaviors of returns of equity that are not explicated by market beta are known as anomalies. "An asset pricing anomaly is a statistically significant difference between the realized average returns associated with certain characteristics of securities, or on portfolios of securities formed on the basis of those characteristics, and the returns that are predicted by a particular asset pricing model" (Brennan & Xia 2001). Simlai (2009), divides these anomalies in four groups, i.e., size and value effect, past returns related, accounting based, and based on credit conditions.

Banz (1981) found the inverse relationship of size and average return in US stock market, and find size effect more significant than beta effect; he proved that small size firms have supplementary average returns than large size firms. This effect was so marked in other international markets like US (Blume & Stambaugh 1983), UK (Dimson and Marsh, 1999), Japan (Berk 1997, Garza-Gómez 2001), Australia (Brown et al. 1983), etc that it is granted as anomaly in asset pricing literature. Size is one of the Claessens et al. (1995) vociferous factors that they proved to price in emerging markets.

Heston et al. (1997) tested beta and size effect in 12 European countries for the period of 1980-1995 and find countries with higher beta have higher average returns and vice versa.

Dimson and Marsh (1999), tested size effect in U.S and U.K for the period of 1955-1983, and 1955-1988, and find significant results for small size effect in both markets. Horowitz et al. (2000b) use the sample period of 1980-1996 for US stock market and by using three different methods they concluded that size and average return relationship does not exist and is not authenticated one. Horowitz et al. (2000a) used 1963-1997 sample of US stock market and proved that size effect is disappearing by the time due to two main reasons; more weight of passive indexation and aware behavior of investors about small firm effect which lowers the returns.

Rosenberg, Reid, and Lanstein (1984), found that high book to market equity stocks shows high average returns. This phenomenon is also known as value effect. Chen et al. (1991), tested the cross section of returns with number of variables like earnings yield,

size, book to market ratio, and cash flow yield in Japanese stock market for 1971-1988 and found book to market equity has most significant effect on average return. Berk (1995) affirms that B/E ratio is inversely related to discount rate; therefore it can serve as risk proxy. Fama and French (1995), in there study institute that high yielding firms have low B/E ratios with negative HML slopes and vice versa, which deduce that return premium on value is because of low profitability and high risk of assets. For the period of 1958-1953 in US stock markets, Kim (1997) reported significant explanatory power of B/E ratio, even after eliminating errors-in-variables predisposition. In other international markets like Hong Kong and Korea this effect is verified by Chiu and Wei, (1998). Gómez (2001) proved the relationships in Japan for the period of 1965-1997. Malin and Veeraraghavan, (2004), tested the value effect in EU markets and found insignificant results in France, Germany and UK.

Size and book to market equity are not independent from each other. There is strong correlation between book to market equity and size due to common factor of price per share. Average return for a size portfolio increases as book to market equity increase, on the other hand book to market equity portfolio return diminish as size increase (Denis et al. 1995). Size and book to market equity also explicate the cross sectional variations of average returns of distress firms; with small size and high book to market equity (Fama & French, 1993).

Nawazish (2008), tested the cross section of average returns with size and value premium

For the period of five years from 2003-2007 and find significant results for Fama French model in KSE. He found significant results for Fama & French three factor model with both financial and non-financial firms. There was bullish trend in the market during the period taken. Researcher pointed out human behavior and investor psychology is unpredictable and the financial model of one period may not hold for other period due to the constraint.

There is long record of events that cannot be explained by Fundamental or Efficient Market theory, bubbles and crashes occurred due to misjudgments of investor's at large scale. Scholars tried to cause Market Crash of 1929, Black Monday of 1987, Dot.com bubble of 1990s, Asian financial crises of 1997 and other events by models of finance that incorporate investors' irrationalities and sentiments. Sentiments are explained by Brown and Cliff (2004) as

> "Intuitively, sentiment represents the expectations of market participants relative to a norm: a bullish (bearish) investor expects returns to be above (below) average, whatever ''average'' may be."

There is a strand of research which attributes the changes in average returns to behavioral factors like noise trading (Kyle 1985; Black 1986), overreaction, under reaction (Lakonishok, Shleifer & Vishny. 1994, Barberis et al. 1998, Daniel et al.1997), investor sentiments (De Long et al. 1990; Siegel, 1992, Barberis et al., 1998), herding behavior (Lakonishok et al., 1992; Grinblatt et al., 1995) etc.

Individual investors who don't possess real information of the security market, base there decision on their own believes and signals from the experts, which are irrational rather than fundamental, and follow *Noise* in the market and are termed as "Noise Traders" (Kyle 1985; Black 1986). Fama (1965) articulate that rational trade and rational arbitrage counterbalance the impact of this noise trading in the market. As these irrational traders continuously lose money due to logical moves of fundamental trading activities, eventually they have to leave the market.

In contrast Figlewski (1979), Shiller (1984) and Campbell and Kyle (1987) argues that arbitrage is restricted; risk aversion and short asset holding time period limits arbitrageurs to take position against irrational moves of noise traders. De Long et. al (1990), set the argument that when noise traders have a specific direction either pessimism or optimism, other than rational one, may follow the pattern in future regardless of the real values. This optimism followed by optimism and vice versa causes a risk, rational investors and risk averse arbitrageurs in this state earn less than their counterparts. This phenomenon directs prices more away from mean rather than mean reversion thus noise trading has its own risk which can explain many asset pricing anomalies.

DeBondt and Thaler (1985) discussed the reversal pattern of average security returns. Assessing long term returns investors use to over estimate the past record of concert due to which past winners loses and past losers have a tendency to out perform. Assets with long pattern of sturdy returns tend to be over valued and give fewer returns due to mean

reversal of returns. They attribute this trend as overreaction. This is substitute to the efficient market explanations, granting that behavior side can affect market equilibrium. Momentum can also affect the non fundamental trade volume, and hence equilibrium (Jegadeesh & Titman, 1993).Regardless of the fundamentals the prices of assets persists to give same returns over a period of time which these are giving in earlier period of one year or more, considered as under reaction (Chan, Jegadeesh and Lakonishok, 1996).

De Long et. al (1989, 1990)(DSSW), integrated both rational and irrational investors in there model for U.S for Close end funds. Irrational investors use to be optimistic or pessimistic merely on the non fundamental news and noisy signals. They verify that noise traders increase the systematic risk and the arbitrage become more risky, so high and low sentiments are priced in the stock market. Also Lee, Shleifer and Thaler (1991), for 1965-1985 in U.S proves that close end fund discount (CEF) can explain sentiments of individual and small investors. They found a significant inverse relationship in sentiments (optimisms/pessimism) and discounts of the asset prices.

Lakonishok, et. al, (1994)(LSV), discussing B/M effect reasoned it by overreaction, investors over/under estimates the performance and overvalue the growth stocks; with low B/M equity, and under value the value stocks; with high B/M equity. So B/M premium in contrast to Fama and French view can be explained by overreaction.

Neal and Wheatley (1998), used different methods like CEF (close end fund discount), odd-lot ratios, net mutual fund redemption, to predict counted measured effects of

investor sentiments on average returns. And find significant results for the period of 1933-1993 in U.S.

Brown (1999) used volatility as direct measure of investor sentiments rather than traditionally used meandering measures. For the period of 1993-94 in NYSE, he confirmed that sentiments of investors are tied with the high trading hours for close end investment funds. There is strong correlation among the proxies of investor sentiments, but the commonly set insight that sentiments is related to small and individual investors is wrong, institutional and large investors may also take steps on emotions and act as noise traders (Brown & Cliff, 2004).

Pastor and Stambaugh (2003) assembled liquidity in the return model by taking difference between portfolios having measures of high and low liquidity (turnover). Baker and Stein (2004) presented this liquidity factor as indirect measure of IS (Investor Sentiments). The overall under-reaction of the irrational investors leads to liquidity in the market. Bid and Ask differences were also taken as proxy for IS. This measure does not delineate individual and institutional investor's behaviors separately. Amihud & Mendelson (1986, 2002) illustrated that liquidity has a negative association with stock market return. When the market is less liquid, it's risky and increase transaction cost in effect investor demands higher premium.

Chiao, Cheng and Hung (2005), proposed a new four factor model by including over-reaction concept of DeBondt and Thaler (1985, 1987) as fourth factor. They created a

new portfolio to imitate overreaction and named it as LMW (loser minus winner). For the period of 1975-1999 in Japanese stock market, the overreaction is significant and persistent when controlled for size and B/E ratio; they demonstrated significant correlation among the Fama and French factors of size and value with fourth factor of overreaction.

Bandopadhyaya and Jones (2005), made an investor sentiments Index for Massachusetts Bloomberg and verified that good and bad news get priced instantly in this measure. Also this Index can explain variations in asset prices. They made point that short term returns can be more significantly explained by investor sentiments than other measures.

Kumar and Lee (2006) used BSI (Buy-Sell Imbalance) as proxy for sentiments for U.S for the period of 1991-1996 on monthly basis. They used multifactor model incorporating Fama & French (1992, 1993) variables of size and value, Jegadeesh and Titman (1993) variable of momentum and BSI as sentiments to explain the cross section of average returns. They find significant results in support of irrational and non fundamental reasoning of stock price movement and found the sentiment measure to be priced in stock market. They argue that there is co-movement in stocks that is when there is a buying behavior in market it prevails from one group of investors to other groups, this also shows non-fundamental (sentimental) behavior.

Prices deviate from the fundamentals due to uninformed demand waves; demand caused by over optimism and over pessimism about the market (sentiments) by irrational

investors or noise traders, and arbitrage limits of being more risky in this situation (Baker & Wurgler 2006). These irrationalities of different investors often move together and form co-movement of the stock, which get priced over long horizons. Due to the behavioral factor pricing, the position of rational investors become more risky which limits arbitrage. According to Baker and Wurgler (2006) Stocks of firms that are new, low capitalized, less profitable or tremendously growing etc are more subject to effects of sentiments. Baker and Wurgler, (2007) argues that the literature and research on this point of time ask scholars to develop reliable measures of investor sentiments and models to calculate the effects (quantification) rather than merely discussing it is priced or not in the stock market.

Kling and Gao (2007) used a survey method to tape the investor sentiments on daily basis. They took sample of 75 institutional investors instead of retail investors; which are considered to capture the noise trading (Kelly, 1997). They find that sentiments have short term impact on asset prices but in long run their significance fails. They have another implication about institutional investors i.e., remarkable impact on market liquidity.

Ho and Hung (2008), integrated investor sentiments in asset pricing models for the time period of 1964-2005 in NYSE and AMEX and institute that asset pricing models with investor sentiments as conditioning information better performs than unconditioned one. By testing on different models they found that size effect is almost insignificant and other factors like value and liquidity are more pronounced and evident.

Verma and Soydemir (2009) used monthly data for the period of 1988-2004 from DJIA and S&P500 in U.S market. They find significant results for the relationship of individual and institutional sentiments with market average returns, which make investors with fundamental or rational beliefs disincline towards investment. They argued that irrational sentiment moves adds the elements of risk in market pricing in contrast to rational ones, this phenomenon leads to bubbles and crises.

Most of the research in sentiments of investors is done for U.S stock market. Recently there are some papers published for Australia, Japan, and China etc. In Pakistan research on such a phenomenon is non existent. There is dire need to unveil the behavioral side of pricing of Pakistani stock market; as it is characterized by sentimental and developing market. Sentiments and irrationality may be priced more as compare to U.S and others.

There are three stock exchanges under SEC regulation of Pakistan, namely Karachi (KSE), Lahore (LSE), and Islamabad (ISE) regarded as emerging market. Among these Karachi Stock Exchange is the biggest in terms of size, value and liquidity. KSE was declared as best among emerging markets in 2002. Hussain and Uppal (1998) found that returns in Pakistani market chase non normal pattern. CAPM does not hold in Pakistani Stock Market and give insignificant results (Javid and Ahmad, 2008), on the other hand Iqbal *et al* (2008) tested Fama-French three factor and proved it to explain asset pricing significantly than other conditional and unconditional models in Pakistan. Nawazish (2008) also tested the three factor model with size and value factors and proved it to be

significant. Even Pakistani market is portrayed as sentimental one there is no single research article on the behavioral/sentimental side of the asset pricing of stock market. This research will fill the gap and provide basis for the research on the behavioral aspects of Pakistani financial market with regular steps of CAPM to Fama French then incorporation of sentiments.

CHAPTER THREE

RESEARCH METHODOLOGY

Pakistan's stock market is characterized as emerging market. It has three stock exchanges with major trading activities held at Karachi stock exchange (KSE). KSE is considered as representative of Pakistani equity market. This study tests asset pricing mechanism In Karachi stock exchange by using market data for the period of 2001-2007.

3.1 DATA

This data is collected from www.brecorder.com, published annual reports of KSE and official website of State Bank of Pakistan for each year from 2001 to 2007 on monthly basis. Data of return, book to market value, size, price, risk free rate of return, turn over rate and trading volume is collected for the period. Total 73 companies are picked from KSE-100 as per criterion selected. The conditions for selection of companies was

1. All companies are part of KSE-100 Index.
2. Data must be consistent for at least for three years from the selection period of 2001-2007.
3. Financial companies were also incorporated in the sample, as Chiao, Cheng and Hung (2005) argued against Fama and French (1992, 1993) that relationship of average returns to SMB and HML is same for financial and non-financial firms. Also in Pakistani market there is a big influence of financial firms.

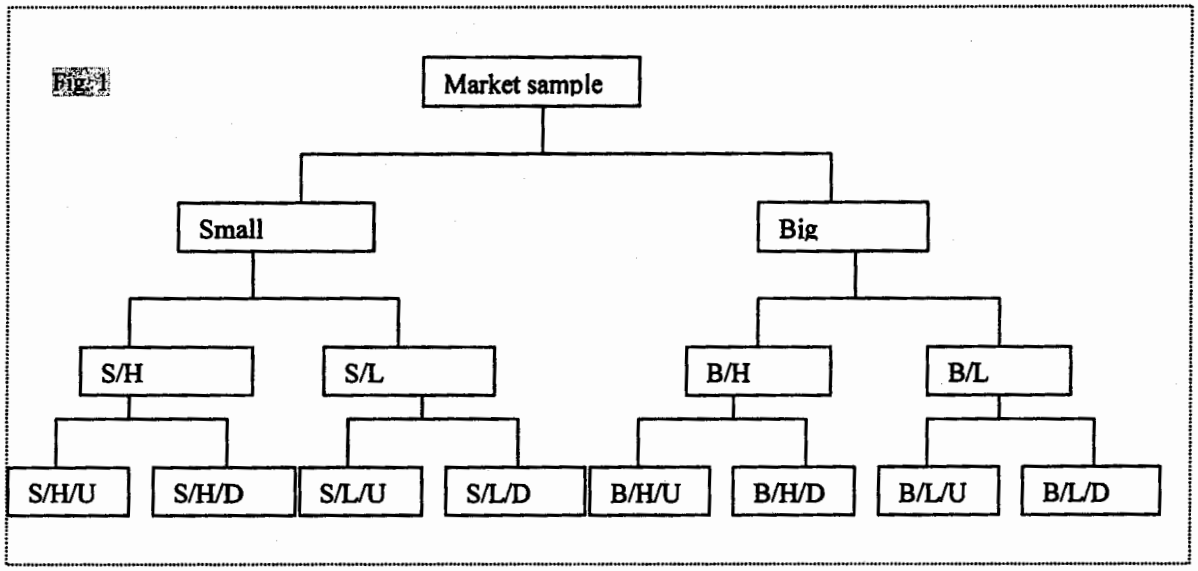
3.2 VARIABLE FORMATION

Equally weighted portfolio outperforms value ones in three factor model, (Fama & French, 1996) for this reason equally weighted methodology is used for variable formation. For creating the variables, simple approach is not workable as we have to separate the effect of size, value and sentiments from each other. For building portfolio in which cross correlation of the variable impacts is diminished a step by step methodology is used. The method for variable formation is borrowed from Fama and French (1993), Carhart (1995) and Ammann & Steiner (2008).

To tape market factor excess of portfolio return to risk free rate is taken, as in CAPM and Fama and French. For the factors of size and value Fama and French (1993) first divided the securities in two groups on the basis of size, then in three groups on the basis of value (2*3). On the other hand Liew and Vassalou (2000) divided each in three groups (3*3). In this study securities are divided first on the basis of size (Market capitalization) in two groups than on the basis of value (book to market equity) in two groups on the basis of median than on the basis of turnover further into two groups (2*2*2). There are two reasons for this approach. First division of factor is two consistently because variable premiums may be sensitive to division of groups into two or three groups. Secondly a total of 73 companies are taken on the basis of criteria, if it were broken into 3*3*3 or 27, portfolios contain only 2.9 or three companies each, this size of portfolio is not representative and results can't be generalized. Vaihekoski (2004) recommends at least 5 companies in a portfolio. Also by this method all securities could not get integrated in the

portfolio and each portfolio has different set of securities. The method followed is depicted in the shape of graphic diagram for more clarity in figure 1.

Figure1: Variable construction for the Pakistani stock market.



To detach factor premiums from each other the method of making portfolio is as follows: All the stocks from KSE 100 after sorting through market capitalization are divided in two groups that is Small (S) and Big (B) by median. These groups are further divided into two groups on the basis of book to market equity through median with High (H) and Low (L) sign and then by the turn over premium into Up (U) and Down (D), that results in creation of portfolios S/H, S/L, B/H and B/L on first level. At level two a total of eight portfolios are formed as S/H/U, S/H/D, S/L/U, S/L/D, B/H/U, B/H/D, B/L/U, and B/L/D. This portfolio can be explained as in S/H/D there are stocks which are small according to market capitalization, have high book to market ratio and low on market turnover during period under consideration, thus impact factor is captured by keeping the influence of the others constant. Ammann and Steiner (2008) used same approach of forming portfolios.

SMB= {(S/H/U-B/H/U) + (S/H/D-B/H/D) + (S/L/U-B/L/U) + (S/L/D-B/L/D)} *1/4

HML= {(S/H/U-S/L/U) + (S/H/D-S/L/D) + (B/H/U-B/L/U) + (B/H/D-B/L/D)} *1/4

IS = {(S/H/U-S/H/D) + (S/L/U-S/L/D) + (B/H/U-B/H/D) + (B/L/U-B/L/D)} *1/4

By this equation we can read SMB as by controlling for market factor, value factor and Investor Sentiments, it's the return of portfolio that is long on small companies and short on big companies. We can interpret HML and IS accordingly.

To sort out whether investor sentiments improves the model performance of CAPM, the following equation, which is tested by OLS is used to test the adequacy of the model

$$Rp - Rf = R_f + \beta_1 (R_m - R_f) + \beta_2 IS_t + \varepsilon t$$

In the above equation R*p* is portfolio rate of return, R*f* denotes risk-free rate of return, R_m is expected rate of return for the market portfolio; ISt is the Equity Market investor Sentiments on month t, and E*t* denotes residual return.

A four-factor time-series model is employed in which the first three factors are those of Fama and French (1992, 1993), the fourth factor is the portfolio sentiment Index measure. That is, we estimate the following factor model:

$$Rpt - Rft = \alpha p + \beta_{p1} RMRF_t + \beta_{p2} SMBt + \beta_{p3} HMLt + \beta_4 ISt + \varepsilon t.$$

Here $RMRF_t$ is market return in excess of the risk-free rate, SMBt is the difference between the equally-weighted return of a portfolio of small stocks and the equally-

weighted return of a portfolio of large stocks, HMLt represents the difference between the equally-weighted return of a portfolio of high B/M stocks and the equally-weighted return of a portfolio of low B/M stocks, ISt is the difference between equally-weighted return of a portfolio of high turnover stocks and equally-weighted return of a portfolio of low turnover stocks, and E*t* is residual return on the portfolio.

3.3 DEPENDENT VARIABLE

Dependent variable in this research is same that of Fama French three factor model, that is excess in portfolio return from risk free rate. And portfolio return is average on all securities included in the eight portfolios formed. This return validates the decision of investor to take risk. Same dependent variable is used for both the models of CAPM and FF incorporating investor sentiments.

3.4 INDEPENDENT VARIABLES

There are total four independent variables; these are *market risk premium, size and value factor and investor sentiments.* Market risk premium is common in both the models of CAPM and FF incorporating investor sentiments. This *premia* is calculated by subtracting risk free rate from market portfolio return. This measure provides a good reason for investing in market rather than risk free securities.

Securities of small companies have high risk of holding as their risk is less diversified and comparatively these are financially stiff, so investors need additional benefit for the

risk in low capitalized firms. *Size factor* encapsulates this risk through SMB; excess return offered by small companies stock to the big ones.

Similarly companies with high book value to market value are more risky, which means that market is not valuing the stocks of these firms as per their book value. As there is high risk in value stocks weighed against growth stocks. High book to market ration may be a resultant of both business and financial risk; indicates that there is distress in progress or investors have low or bad expectations regarding future returns; investors call for higher returns and *Value factor* or HML measures this risk.

Fourth independent variable is Investor Sentiments. Irrational investors take more long positions and make the market more liquid and hence high turnover rate. Stocks with high turnover rate have high transaction cost too which in effect trim down the security returns. Investors buying stocks with high turnover have higher risk and need compensation for this risk as higher returns. Amihud and Mendelson (1986) explain that high liquidity (high turnover) is coupled with lower expected returns and low liquidity or *Illiquidity* is associated with high expected returns. IS calculates this risk measured by difference between high turnover and low turn over stocks.

3.5 HYPOTHESIS

H1: Incorporating investor sentiments improves the model performance of CAPM.

H2: There is significant positive impact of book to market equity on asset prices.

H3: There is significant negative impact of size on asset prices.

H4: There is significant negative impact of investor sentiments on asset prices.

H5: A multi factor time series model incorporating, market return in excess of risk free return, SMB, HML, and investor sentiments better explain asset prices.

H6: This new four factor model better explains the movements in equity market than CAPM.

3.6 MEASURES OF INVESTOR SENTIMENTS

As in Pakistan there is no established investor sentiment index at Karachi Stock exchange. There are many possible proxies that can be used to tape investor sentiments, but due to limitation of time and data available, only one proxy can be used, that is

As in secondary market taking long positions either opening or closing is easy and less costly than short positions. In this situation noise traders or irrational traders increase traded volume in the market by taking more long positions (Baker & Stein, 2004). Also trading volume represents the variations in attitude and estimations towards risk (Scheinkman & Xiong, 2003). Irrational investors are more interested in trading when there is bullish trend in market rather than when the prices are becoming low. So liquidity or trading volume which is measured by portfolio turnover can be used as proxy for IS. In Pakistan case the monthly market turnover data is available for Karachi Stock exchange. Other possible proxies identified and evaluated to use are as follows.

Surveys like CCI (Consumer Confidence Index) or USB/ Gallup surveys are recommended to use to gauge investor sentiments (Shiller, 1989; Qiu & Welch 2006).

This measure of IS has a strong correlation with small sized firm returns and is usually used to tape retail investors sentiments. These surveys are conducted by asking simple questions which show there expectations about the securities return. It is almost impossible to conduct such survey by the researcher as it involves primary data from investors in KSE 100 index. And researcher has time and cost constraints to work in Karachi city.

Investor mood is also used as proxy for sentiments. This mood is attached with weather like winter, summer, fall and autumn; part of the day like morning, noon and evening etc (Kamstra *et al.* 2003). Some scholars like Edmans *et al.* (2006) attached the sentiments with major games played in country under observation and found significant results. This measure is not recommended much by the scholars, the robustness of this proxy in Pakistan is questionable.

Organized sentiment theory is backed by the phenomenon that individual investors are more prone to be driven by sentiments than do the institutional one (Barber *et al.*(2003); Kumar & Lee(2006). Individuals are not that specialized and skilled especially young people; these retail investors' activity of buying and selling is usually irrational and is not based on information. So there activity can be used as index of IS. This research captures overall sentiments of the investors in the KSE-100, which comprises both the retail and institutional investors.

Brown *et al.* (2002) describes the IS by taking into account the shift of investment between less risky assets like government bonds to more risky equity securities classified as growth stocks. It has been noticed that securities which are more liquid; have more fund inflow suffer from reduced returns in future. In Pakistan the performance of mutual fund flow is very poor and it does not provide the main supposed advantage of diversification. Open equity market has higher returns than do these mutual funds.

Firms that pay dividend to their share holders provide a perception of safety. Premium of dividend is explained as the difference between the M/B ratio of firms paying and not paying dividends (Baker and Wurgler, 2004). Securities with consistent flow of dividend payments are like bonds. So this premium is the contrary measure of IS for the securities that pay dividends. In Pakistan however this measure can't be applied as there are very few firms which pay dividends. It can't be applied to whole KSE market or even 100 Index.

Discount or premium on closed end funds is mostly used as sentiment index in the literature. Theory behind the usage of closed end fund is that; these funds are held by individual or retail investors who are more prone to sentimental decisions than informational or fundamental one (Weiss, 1989). Lee, Shleifer and Thaler (1990) argue that prices of other securities also move consequently with the close end fund discount or premium. When there is bullish sentiments there are premiums on the stock and vice versa (Zweig, 1973).

This measure is used as sentiment's index as when the volatility of the securities underlying the option increases, the prices of options both long and short positions also increases (Whaley, 2000). Black Scholes model is normally used to create this Index. As Pakistan has no option and derivative market, so this measure can't be applied here.

Occasionally on first day of IPO returns are so high that we can't elucidate it by fundamentals. The volume of this first day IPO and returns are extremely related with other measures of investor sentiments. In this very research we are not using this proxy as this is case sensitive and we can't conduct a full time series analysis of KSE market, which can elaborate entire characteristics of secondary market. Volume can also be used as proxy, as the demand behind the irrational ups and downs of trading are random and can be explained by irrational theories of sentiments.

Scholars like Seyhun (1998) argue managers of the firm have better knowledge about the firm's returns and financial position. So there own stock portfolios expose their analysis about the returns and this insider trading may have sentiments with systematic module. As it is far away from the reach of researcher to have information about insider trading, this is the reason that this measure is not used.

Shiller (1984) and Kumar & Lee (2006) explicate that retail investors normally don't trade on fundamentals rather they follow the trendy models, volumes, returns pattern etc. There is correlation between this retail investor's trading and these move together (co-

movements). So the imbalance of buy and sell patterns of these investors may be used as sentiment proxy.

3.7 STATISTICAL ANALYSIS

For finding characteristics of data mean, Standard deviation, t-statistics, skewness, kurtosis, maximums and minimums were taken. To check the normality of data, tests of normality is applied. Correlation is found among the variables. To avoid multi collinearity in the model VIF (variance inflationary Function) test is applied on adjusted R^2. Regression analysis is then run to check the dependency of variables.

CHAPTER 4

RESULTS AND DISCUSSION

This study analyzes the behavior returns by employing market, size, value, and sentiments in asset pricing models.

Table 1 reports the statistical characteristics of market, size, value and investor sentiments returns calculated for the period under consideration. Market risk return has highest average return of 2.6% with S.D of about 8% followed by 1.14% of size sorted portfolio, 0.61% of value sorted portfolio and 0.37% of sentiment sorted portfolio. followed by value factor, size factor and sentiment factor, while the minimum returns are associated with value factor i.e. -19%. The S.Ds are more than 6.4% in every factor which shows the high volatility and risk in Karachi Stock exchange.

Table 1: Descriptive Statistics

	RMRF	SMB	HML	IS
Average return	.0263	.0114	.0061	.0037
Standard deviation	.08051	.07237	.06457	.06748
Skewness	.098	.165	.036	.216
Kurtosis	.023	.165	2.062	.767
Maximum	.24	.20	.22	.18
Minimum	-.15	-.18	-.19	-.15

Table 2 demonstrates the characteristics of the fourteen sub portfolios. The widest range of returns is provided by SHU (min -.61, max .70) followed by SHD (min -.57, max .69), and the lowest rage is given by the sub portfolio big/low (min -.13, max .19) followed by

BLD (min-.16, max .17). SHU also shows highest average returns for the period. High standard deviations of all portfolios depict the risky and volatile characteristics of the market. By skewness the distribution is not seems to be problematic as most of the portfolios have near zero skewness, small (-.320), small/high (-.532), BLD (-.176), SLU (-.380) are negatively skewed and the rest are positive ones. Regarding kurtosis most of the portfolios have flatter distribution except SHD (9.514) and SHU (6.781) that depicts highly peaked portfolio distribution.

Table 2: Descriptive Statistics for KSE-100 Index returns for sub portfolios of the factors under consideration

	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Small	-.22	.24	.0309	.08353	-.320	.648
Big	-.13	.25	.0204	.07719	.167	.404
Big/low	-.13	.19	.0158	.07104	.023	-.217
Big/high	-.16	.33	.0245	.09056	.398	.927
Small/low	-.15	.20	.0301	.07034	.143	-.311
Small/high	-.40	.35	.0320	.12220	-.532	2.646
BLD	-.16	.17	.0151	.06753	-.176	-.051
BLU	-.20	.28	.0165	.09992	.112	.077
BHD	-.14	.26	.0215	.08454	.160	.113
BHU	-.19	.46	.0278	.11124	.663	2.436
SLD	-.13	.25	.0289	.06412	.708	1.224
SLU	-.29	.27	.0311	.09461	-.380	1.042
SHD	-.61	.70	.0307	.16693	-.061	9.514
SHU	-.57	.69	.0355	.15419	.154	6.781

Figure 2 reports the cumulative returns of four factors, remarkably high returns of market factor is in line with Ammann and Steiner (2008), work on Swiss market. Cumulative returns for size factor rank second with an average return of 1.14% per month, Value and Investor sentiments returns are generally lower.

Figure2: Cumulative returns of four factors.

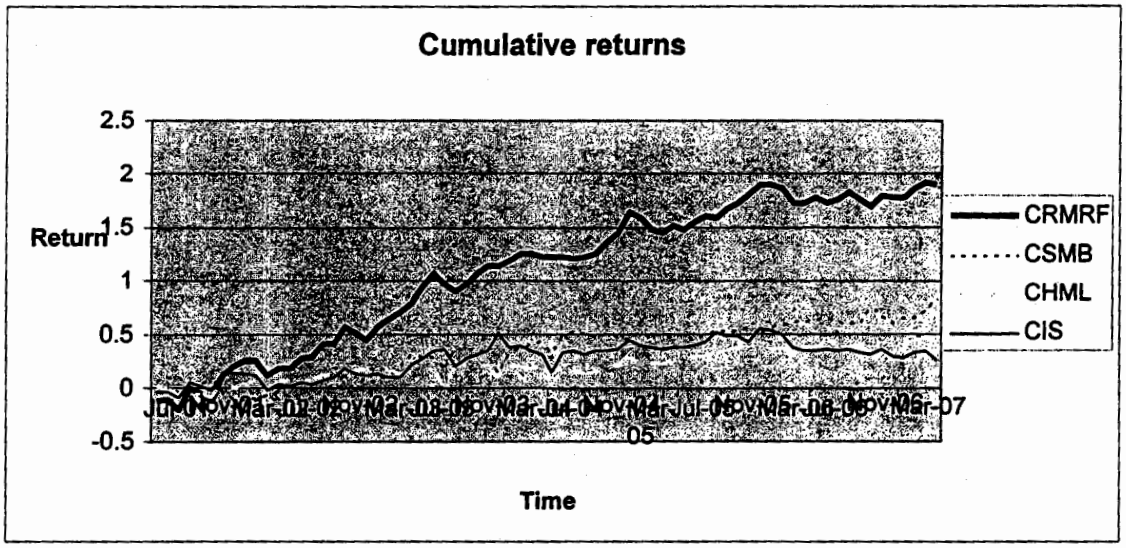


Table 3 shows the correlations between Fama and French three factors and Investor sentiments. The negative correlation between RMRF and SMB supports the literature on size and market factor and has expected structure (Banz (1982), found the inverse relationship of size and average return). Size factor has positive 0.357 correlations with HML and negative -.327 with IS.

Table 3: Correlations of KSE-100 Index returns

	RMRF	SMB	HML	IS
RMRF	1			
SMB	-.320(**)	1		
HML	.310(**)	.357(**)	1	
IS	.590(**)	-.327(**)	.093	1

Bowerman and O'Connell (1990) suggested the test of VIF for checking the possible multi collinearity in the model. The possible multi collinearity in regression model is stained by applying VIF test on adjusted R^2; and it reports that it is within permissible limits significantly.

Table 4 presents the results of variance Inflationary Function. All tolerances are greater than 0.1 which indicates that there is no serious problem; also the average VIF is close to 1 which tells us that collinearity is not a problem for the proposed model.

Table 4: Collinearity Statistics

	Collinearity Statistics	
	Tolerance	**VIF**
(Constant)		
RMRF	.517	1.933
SMB	.654	1.529
HML	.671	1.489
IS	.630	1.587

First of all relationship of market risk premium and return is tested by regression analysis. If CAPM is valid than constant should be zero and beta must explain the variations in the cross section of average premiums. Table 5 reveals that there is

significant positive relationship between market premium and portfolio return and model explains 71.2% of total variation in dependent variable of significance level 95% F value indicates the fitness of model. Beta is also significantly different from zero and market returns explain the variations in expected return. Results show that CAPM holds in Pakistani Stock market, which is in line with the previous studies by Iqbal *et al (*2008), and Nawazish (2008) on Karachi Stock exchange.

Table 5: CAPM equation

	Un standardized Coefficients						
	B	**Std. Error**	**t**	**Sig.**	**Adjusted R Square**	**F**	**Sig.**
(Constant)	.001	.005	.149	.882	.712	176.432	.000
RMRF	.753	.05	13.283	.000			

By adding size factor in the CAPM, the explanatory power of the model increases which means that Pakistani market prices size factor in the decisions. Table 6 reports that model is correct by F=205.584 significant at 99% confidence interval. SMB has significant positive relationship with equity returns. It means small stock earn higher returns in comparison to big stocks.

Table 6: CAPM with size factor

	Un standardized Coefficients						
	B	**Std. Error**	**t**	**Sig.**	**Adjusted R Square**	**F**	**Sig.**
(Constant)	-.007	.004	-1.900	.062			
RMRF	.865	.043	20.193	.000	.852	205.584	.000
SMB	.391	.048	8.209	.000			

The book to market equity or value factor is then added to the CAPM as reported in table 7. It also increases the fitness of model by F: 142.275 as well as explanatory power by

increasing adjusted R^2 to 0.799, t statistics is also significant. It means high book to market equity stocks are earning higher returns in comparison with low book to market equity stocks. Both size and value premium are proved and have significant positive relationship with equity returns, which is in line with the theory and model proposed by Fama & French (1995).

Table 7: CAPM with Value factor

	Un standardized Coefficients						
	B	**Std. Error**	**t**	**Sig.**	**Adjusted R Square**	**F**	**Sig.**
(Constant)	.001	.004	.220	.826			
RMRF	.666	.050	13.385	.000	.799	142.275	.000
HML	.348	.062	5.606	.000			

Table 8 indicates that by adding Investor Sentiment proxy to CAPM equation the explanatory power of model increases as adjusted R^2 become slight more in figure that is .716 with negative IS -.115 beta, with t- statistics not significant. By adding this factor the beta of RMRF is not significantly different from zero with significant t-statistics 11.611. Investor Sentiment is not proved by market as it has insignificant negative relationship with returns. It means in Pakistan low turnover stocks earn high returns. Still it increases the explanatory power with fitness of F 90.315 and P value .000.

Even the t-statistics of IS is not significant the negative sign with IS indicates that stocks with low sentiments or illiquid stocks have high returns than that of liquid stocks. This confirms with the theory of Amihud and Mendelson (1986) which says high liquidity (high turnover) is coupled with lower expected returns and low liquidity or *Illiquidity* is associated with high expected returns. Which apposes the Pastor & Stambaugh (2003)

reverse argument stating that high liquidity responsive stocks earn high returns and vice versa.

Table 8: CAPM incorporating Investor sentiments.

	Un standardized Coefficients						
	B	**Std. Error**	**t**	**Sig.**	**Adjusted R Square**	**F**	**Sig.**
(Constant)	.000	.005	-.074	.941			
RMRF	.809	.070	11.611	.000	.716	90.315	.000
IS	-.115	.083	-1.381	.172			

Fama and French three factor model captures not only market premium but also size and value premium. FF three-factor model is valid when its constant is near to zero and betas of factors should be significantly different from zero. Table 9 presents the results of regression of FF three factor model, which clearly shows that it captures the cross sectional variations of market more visibly than do CAPM and two factor models described above. Results are very encouraging as all factors have significant betas; RMRF with beta .801 with t (17.25) with P value less than .001, beta of SMB .314, t (5.98) with P value less than .001 and HML beta as .17, t (2.89) with P value less than .005. The adjusted R^2 shows that the model explains 86.6% variation in the dependent variable which indicates the high explanatory power of the model. The model is also fit as checked for F-statistic.

Table 9: Fama and French three factor model

	Un standardized Coefficients						
	B	**Std. Error**	**t**	**Sig.**	**Adjusted R Square**	**F**	**Sig.**
(Constant)	-.005	.003	-1.520	.133			
RMRF	.801	.046	17.257	.000	.866	154.571	.000
SMB	.314	.053	5.981	.000			
HML	.170	.059	2.899	.005			

Proposed four factor model:

The results of new four factor model are not encouraging and as anticipated. As per Table 10 by adding investor sentiments in the model the model's explanatory power slightly decreases instead of increasing from 0.866 to 0.865, which is against the hypothesis that IS with increase the model performance, but still the model is significantly fit by F=114.491. Fourth factor IS has insignificant t-statistics with negative sign, that shows investor sentiments are not priced in the market.

These results shows that in Pakistani sock market Fama & French(1992, 1993) Model is more appropriate and out performs the model with sentiments. This is confirming the studies of Nawazish (2008) and Iqbal *et al.* (2008).

Study also concludes that in Pakistan efficient market hypothesis sustains rather than proposed in-efficient based on sentiment theory. Pakistani market follows the fundamentals for returns pattern.

Table 10: Fama-French model incorporating Investor sentiments

	Un standardized Coefficients						
	B	**Std. Error**	**t**	**Sig.**	**Adjusted R Square**	**F**	**Sig.**
(Constant)	-.005	.003	-1.543	.127			
RMRF	.811	.054	15.017	.000			
SMB	.311	.053	5.829	.000	.865	114.491	.000
HML	.169	.059	2.869	.006			
IS	-.022	.058	-.370	.712			

Table 11 presents the resulting constants, betas, adjusted R^2, F- statistics and their significance for the four Fama and French model incorporating investor sentiments. These calculations are based on the regressions with following generic model for all sub portfolios.

$$R_{spt} - Rf_t = \alpha p + \beta_{p1} RMRF_t + \beta_{p2} SMB_t + \beta_{p3} HML_t + \beta_4 IS_t + \varepsilon t.$$

In this equation R_{spt} is the premium on the specific sub portfolio the four factor model proposed under consideration. Where αp is the constant term where $RMRF_t$ is the excess of market return from the T- bill rate taken as risk free rate. SMB_t, HML_t **and** IS_t are the factors of size, value and Investor sentiments with their respective factor loading associated as β. And εt is the residual term.

As the table portray the four-factor model is correct with good fitness at P value .000. All the models have high explanatory power more than .70 except B/L/D with .371 and S/L/D .471. S/H has highest Adjusted R^2 that is .919. W (.865), S (.895), B (.884), B/H (.866), S/H/U (.804), S/H/D (.868) have adjusted R^2 more than .80.

SMB and HML are significantly contributing to the all portfolio settings. Whereas the fourth proposed variable is not significant in most of the models. But the expected optimal portfolio model that is S/H/U has significant contribution of Investor sentiments, IS is also significant in S/H/D and S/L/D. So the liquidity proxy of IS can not be totally negated, it is priced in different portfolio setting in Pakistani market. Investor can get higher return, and can exploit the imperfections in the stock market.

Table 11: Power Explanatory Table of factors with sub portfolios:

	Constant	RMRF	SMB	HML	IS	Adj-R^2	F	Sig.
W	-.005	.811	.311	.169	-.022	.865	114.491	.000
t-statistic	-1.543	15.017	5.829	2.869	-.370			
P value	.127	.000	.000	.006	.712			
S	-.006	.829	.800	.176	-.019	.895	152.978	.000
t-statistic	-1.666	14.904	14.537	2.883	-.324			
P value	.100	.000	.000	.005	.747			
B	-.005	.811	-.186	.168	-.019	.884	135.702	.000
t-statistic	-1.343	14.954	-3.474	2.834	-.318			
P value	.184	.000	.001	.006	.752			
S/H	-.009	.768	.879	.925	-.027	.919	202.970	.000
t-statistic	-1.885	10.764	12.460	11.845	-.351			
P value	.064	.000	.000	.000	.727			
S/L	-.003	.895	.720	-.574	-.015	.742	51.968	.000
t-statistic	-.629	12.119	9.849	-7.101	-.182			
P value	.532	.000	.000	.000	.856			
B/H	-.003	.879	-.247	.378	-.042	.866	115.874	.000
t-statistic	-.656	12.894	-3.661	5.070	-.563			
P value	.514	.000	.000	.000	.575			
B/L	-.007	.754	-.141	-.047	-.026-	.767	59.546	.000
t-statistic	-1.533	10.697	-2.026	-.610	.347			
P value	.130	.000	.047	.544	.730			
S/H/U	.000	.404	.953	.642	1.511	.804	73.665	.000
t-statistic	-.046	2.881	6.859	4.178	9.955			
P value	.963	.005	.000	.000	.000			
S/H/D	-.014	1.113	.759	1.265	-1.557	.868	117.888	.000
t-statistic	-1.738	8.953	6.174	9.299	-11.588			
P value	.087	.000	.000	.000	.000			
S/L/U	-.009	1.074	.919	-.715	.197	.706	43.630	.000
t-statistic	-1.318	10.169	8.797	-6.187	1.729			
P value	.192	.000	.000	.000	.089			
S/L/D	.003	.692	.580	-.513	-.286	.470	16.754	.000
t-statistic	.549	7.185	6.090	-4.862	-2.750			
P value	.585	.000	.000	.000	.008			

	Constant	RMRF	SMB	HML	IS	Adj-R^2	F	Sig.
B/H/U	.000	.907	-.436	.637	.018	.839	93.367	.000
t-statistic	.021	9.872	-4.795	6.339	.179			
P value	.983	.000	.000	.000	.859			
B/H/D	-.006	.861	-.065	.137	-.106	.663	35.957	.000
t-statistic	-.888	8.544	-.656	1.237	-.972			
P value	.378	.000	.514	.220	.335			
B/L/U	-.011	.899	-.225	.116	.139	.741	51.708	.000
t-statistic	-1.601	8.605	-2.176	1.018	1.235			
P value	.114	.000	.033	.312	.221			
B/L/D	-.003	.620	-.064	-.208	-.189	.371	11.466	.000
t-statistic	-.487	5.616	-.585	-1.719	-1.583			
P value	.628	.000	.561	.090	.118			

Table 12 presents the summary statistics of all the models one by one. By this we can easily see adjusted R^2 is by refining model. All models have significant F statistics. As we can see CAPM has lowest adjusted R^2. Two factor models are better than CAPM but size factor 0.852 is more pronounced and priced than do value 0.799 and IS 0.724. Three factor model of Fama and French (1992, 1993) has greater explanatory power .866 than CAPM and two factor models, which is in line with the existing literature on emerging markets. FF model is also proved in KSE by Nawazish (2008), Attiya (2008) and others. The four factor model incorporating IS also holds with greater explanatory power than CAPM and two factor models but has slightly less adjusted R^2 that is .865 then three factor model. So the best model is FF three factor model that captures size and value effect along with market. Alternatively, it can be deduced that size and value factor captures the other factors effectively that there is no need to incorporate fourth variable, this conclusion is in line with Fama and French (1996), which argues that these two factors can serve as proxies for other factors that are still to be explored.

Table 12: Explanatory power of Pakistani Factors in different models

	CAPM	2F-SMB	2F-HML	2F-IS	3FF	4FF
R	.846	.925	.897	.851	.934	.934
Adj. R^2	.712	.852	.799	.724	.866	.865
F	176.432	205.584	142.275	90.315	154.571	114.491
P	.000	.000	.000	.000	.000	.000

CHAPTER FIVE

CONCLUSION

Pricing of assets is the most discussed and debated topic in the finance literature and research circles. Capital Asset pricing model's beta was regarded as best to describe the systematic risk. Then Fama-French three-factor model was in the stream-line, different studies tested it on different countries and comparisons were made, it got mix results but most of the results were better than beta alone. With rational asset pricing models there is a parallel discussion which challenged efficient market hypothesis and bring investor sentiments and irrationalities to set the prices. This study tested the sentiment factor by Investor Sentiments as fourth factor in FF model.

Secondary data was taken from KSE-100 index companies for the period of 2001-2007 on monthly basis. A total of 73 companies were selected on the basis of criteria of consistency of returns. Monthly T-bill rates were taken as risk free rate for comparison and turnover rate (liquidity) was taken as sentiment proxy. Equally weighted eight portfolios were managed according to size, value and turnover rate.

5.1 SUMMARY OF FINDINGS

All models tested are significantly explaining the Karachi Stock Exchange. CAPM explains the cross section of equity returns through market premium by .712 significantly but when we add 2nd factor of size and value the explanatory power increases. Size factor is more causative and distinct by .852 adjusted R^2 in Pakistani Stock Market followed by

value factor .852 and then Sentiment factor by .799 adjusted R^2. FF three factor model outperform other models and explains the variation in equity returns by .866 adj. R^2. So size and value factor along with market adequately explains the emerging stock market of Pakistan.

The results of the study are non-conforming to general perceptions as the proposed new factor of Investor Sentiments, captured by taking difference between high turnover and low turn over stocks as proxy, proved to be insignificant with CAPM as well as FF three-factor model. However we cannot over rightly negate the IS in Pakistani market as it showed significant results in three portfolios i.e. S/H/U, S/L/U and S/L/D. Also the negative sign with IS beta indicates the direction of liquidity and asset return relationship. It shows that low liquidity stock earns high return and high liquidity stocks earns low returns, investor demands high premium for less liquid assets, which is in line with the findings of Amihud and Mendelson (1986, 2002).

It can also be concluded that size and value factor captures other undiscovered factors effectively; this conclusion is in line with Fama and French (1996), which argues that these two factors can serve as proxies for other factors that are still to be explored

5.2 POLICY IMPLICATIONS

These results have several implications. First in Pakistani market or more specifically Karachi Stock Exchange, Fama and French three-factor model adequately explains the cross section of returns, which confirms the results of Nawazish (2008) and Iqbal *et al.*

(2008). These results have implications for investors, fund managers and policy makers, as the overall WACC calculation and capital budgeting decisions are dependent on appropriate measurement of cost of equity and all buying and selling, project appraisals, merger and acquisition decisions, investment allocation and capital structure depends on proper valuation. Investors and managers can devise optimal strategies by considering the results which shows that traditionally used CAPM approach is not appropriate to find these determinants, FF three factor model is more suitable approach fitting in local situation. Regarding Investor sentiments results, investors and fund managers can have better and different investment strategies by rebalancing of portfolios based on the sentiment factor as it gives significant results with certain portfolio settings and is occasionally priced.

KSE should also maintain an index of Investor Sentiments as all developed markets do maintain. It will not only facilitate mangers, fund managers, investors and policy makers but also academicians and researchers to more clearly define the patterns in the Pakistani stock market.

5.3 FUTURE RESEARCH

Future research can be done with industry specific portfolios rather than the stylized portfolio used. One can also test these hypotheses on daily and weekly data as sentiments work in shorter time horizons. Other proxies like close end fund discount, Buy-sell imbalance, and mutual fund flow must be checked to confirm the results in further studies. Also the portfolio construction setting can be changed to verify the results. We

can also test the models on retail investors and institutional investors separately as there are *big players* in the market.

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