CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY, ISLAMABAD

Agency-Based Asset Pricing Model: Empirical Evidence from Pakistan Stock Exchange

by

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A thesis submitted in partial fulfillment for the degree of Master of Science

in the

Faculty of Management & Social Sciences
Department of Management Sciences

2018

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This thesis is dedicated to my family, teachers and all those friends who have supported me since the beginning of this thesis. I would specially dedicate this thesis to my supervisor Dr. Ahmad Fraz for his guidance and motivation to complete my research work devotedly and heartedly.

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Acknowledgements

This research thesis has been effectively completed with the help of my teachers and friends. I would like to say thanks to those who guide me throughout the duration of completing this research thesis.

Firstly, I would like to thanks to Allah Almighty without his help I would be unable to complete my research thesis. After that I would like to express my gratitude to my supervisor Dr. Ahmad Fraz, who helped me all the way through his guidance, advices, productive comments, time commitment and reply to the queries throughout my thesis. Dr. Ahmad Fraz has always been there to help me complete my work. Surely, without his help I could not be able to complete this research thesis.

Moreover, unconditional love and support from my family members, especially my father, mother and my wife have helped to complete this work

Abstract

This study examines the relationship among size premium, value premium and equity returns in Pakistani equity market for the period of June 2002 to June 2017 by using Blitz (2014) agency-based asset pricing model. This study explores the relationship among stated variables by employing agency-based model. Sample of 84 firms listed at the Pakistan Stock Exchange is used. An analysis of the results reveals that size and book to market ratio are priced by market. Size factor is found significantly positively related to stock returns at 95% confidence interval for small stocks portfolio while insignificant for portfolio having big firms. Book to market factor is also found significantly positively related to portfolio returns except small and big stocks with low book to market ratio. The explanatory power of Blitz three factor model is 30% and 12% higher than explanatory power of conventional capital asset pricing model (CAPM) and F&F three factor model respectively. The results of this study show the validity of agenc-based asset pricing model in Pakistani stock market. These results are important, in the sense, that these can facilitate investors in efficient resource allocation.

Keywords: Asset pricing, Fama and French 3-factor model, Agency problems, Delegated portfolio management, Agency-based asset pricing model.

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Chapter 1

Introduction

1.1 Background

The foundation of modern finance is laid down by Markowitz who starts the discussion about risk and return of the portfolio. Markowitz (1952, 1959) argues that investors are risk-averse and choose their portfolios on the basis of mean variance efficiency. This discussion has attracted attention of many research practitioners and scholars soon after the publication of Sharpe (1964) seminal paper on capital asset pricing model (here after CAPM) which describes and quantifies systematic risk.

The basic objective of the CAPM is that all investors invest in the optimal portfolios with lower risk and higher expected return. CAPM links the risk with return linearly. i.e. equity with high risk leads to earn higher return and with low risk to earn low return. CAPM assumes that investors hold well diversified portfolios having unsystematic risk along with systematic risk i.e. market risk or beta. Unsystematic risk is company specific and diversifiable but systematic risk is not diversifiable as it is related to market and is common for all stocks in that market. In CAPM the only factor that explains the return is market premium (Rm-Rf). Later on Black (1972) is the first to find that security market line (SML) is flatter than predicted by CAPM of Sharpe (1964) and Linter (1965). The findings of Black (1972) are not consistent with standard CAPM and show its weaknesses.

However, various other researchers have also reported anomalies based on different firm based variables other than market premium.

The first criticism is raised against CAPM by Ross (1976), in his paper he provides that not only a single factor but there are several risk factors that might affect the return and proposes an alternative model named Arbitrage Pricing Theory. Banz (1981) identifies that on average smaller companies has high risk adjusted return than larger ones. This is called size effect. While Basu (1977, 1983) finds that companies with high P/E ratio capture more return than CAPM. The effect of B/M (hereafter B/M) ratio has identified by (Statman, 1980; Rosenburg, Ried & Lenstien, 1985). Bhandari (1988) investigates the leverage effect that is companies with higher leverage capture high return than expectations on the basis of betas. Moreover, Fama and French (1992, 1993); Jagdeesh and Titman (1993) and Carhart (1997) investigate factors based on size (small-big), B/M value (value vs growth) and return momentum of equities (winner vs losers) respectively.

Most of the establish asset pricing theories rely on the assumptions that capital markets are entirely inhabited by individuals who act rationally and get benefited by their rational decisions, capital markets are efficient and investors make use of all obtainable arbitrage options (Dimson & Mussavian, 1999), with the exception of Ross's APT. However, these assumptions have become more and more difficult to sustain in subsequent years due to the fact that institutional investors require different from individual investors because of agency issues evolve from the delegated portfolio management (here onward DPM). Independent investors are usually worried about the return attributes of their portfolios and this is the only major concern, whereas investment managers have other issues while constructing portfolios. Consequently, it seems possible that if capital markets have become institutionalized this would have a major effect on the valuation of equities, asking for an equilibrium model which considers the agency effects.

The widely accepted reason for agency affects which develop due to delegated portfolio management (hereafter DPM) is benchmark-driven investment (Blitz and Van Vliet, 2007; Felkenstein, 2009). The understanding here, is delegated portfolio managers are conventionally appraised on their return generating capabilities with

respect to a benchmark portfolio, therefore they are motivated to pay more for high-beta equities for higher expected returns, and to disregard equity with low expected returns that is low beta equity.

The agency effects that emerge from DPM can result in the equilibrium relation between expected equity return and CAPM's beta to become flat, instead of positively linear (Blitz, 2014) and he proposed a model based on an agency substitute to the broadly used Fama and French 3-Factor Model (hereafter F&F 3FM), which embodies this insight. He compares both models and shows that his suggested agency based asset pricing model is better at explaining the portfolio performance based on beta or volatility, and at par in explaining the performance of portfolios sorted on size and value factors which the original 3FM was designed to explain. The aim of this study is to examine the impact of Agency-Based asset pricing model presented by (Blitz, 2014) in Pakistan's equity market along with F&F 3FM.

1.2 Theoretical Background

Risk and return trade-off is the fundamental rule of capital market theory. Thus, modern portfolio theory is important because it identifies real risk substitute in determining stock returns and premiums required for bearing such risks. Markowitz (1952) has presented his theory of mean-variance and best possible portfolio selection method which is one of the initial studies on this primary risk return relationship.

The renowned analysis of mean-variance by Markowitz (1952) is played an essential role in the development of modern portfolio theory which later on becomes a foundation for the CAPM. Providing the modern finance a mathematical framework, diversification concept and most importantly efficient portfolio frontier which is considered as a fundamental rule for present portfolio analysis. Markowitz (1952) appears to approach the peak of its lifetime work by developing a method to quantify the concept of risk which was merely a concept before his study. The financial justification behind this theory is the risk-aversive behaviour of stock holders in

the capital market. According to this theory, it is possible to produce an "efficient frontier" of best possible portfolio that offers highest achievable return for a particular risk level. The segregation between risk of single stock and return unpredictability of single portfolio has been the key contribution of Markowitz's work. Modern portfolio theory also known as management portfolio theory that measures the advantages of diversification calling "not putting all of your eggs in one basket". The extension of this theory by Sharpe (1964) and Treynor (1965) lead the foundation of Capital asset pricing model (CAPM).

Sharpe (1964) proposes Capital Asset Pricing Model for portfolio analysis this leads to evolution of capital market theory. In extension to Markowitz (1959) work, Sharpe suggests that securities are likely to co-move with the market. Under conditions of market equilibrium the relationship of risk-return is determined by CAPM. An important aspect of CAPM introduces an asset choice paradigm that is a risk-free asset. Efficient portfolios lie on the efficient frontiers and risk-free rate is intersected by the vertical axis at the line tangent to these portfolios. Market or super-efficient portfolio is regarded as the portfolio matching to point of intersection, a representation of the most favourable combinations of risk and return accomplish by combining this super-efficient portfolio and investment in the risk-free security. Their risk appetite forms the basis for investors to take buy or sell positions in the risk-free assets. The principle belief of the model is; returns of equities are evenly linked to immense movements in market index. Beta is the degree of sensitivity of equity to market.

CAPM states that what ought to be the require rate of return on risky equities. According to CAPM a single factor market premium (Rm-Rf) have an effect on the portfolio return. Investor can diversify the risk of his portfolio but cannot avoid the risk associated to his investment entirely because of the presence of systematic risk (i.e. market risk) or market beta which is same for the entire market. It believed market beta as the sole risk-factor that explicate cross-sectional discrepancy in returns. This sole factor is criticized by numerous researchers, who stated that CAPM could not be able to explain the relationship of risk & return in a better way. Ross (1976) critically assess the CAPM in his study that became landmark in the

empirical analysis of CAPM. He fully negated the consideration of market's beta as an only unit of measuring market risk; by disagreeing that index of market have to incorporate all the resources of investors. For that reason, the proxy employ for market portfolio in the CAPM's notional framework do not correspond to the perfect market portfolio.

An important aspect of CAPM introduces an asset choice paradigm that is a risk-free asset. Efficient portfolios lie on the efficient frontiers and risk-free rate is intersected by the vertical axis at the line tangent to these portfolios. Market or super-efficient portfolio is regarded as the portfolio matching to point of intersection, a representation of the most favourable combination of return and risk accomplished by combining this super-efficient portfolio and investment in the risk-free security. Their risk appetite forms the basis for investors to take buy or sell positions in the risk-free assets. The principle belief of the model is; returns of equities are evenly linked to immense volatility in market's index. Beta is a scale of sensitivity of equity to market.

Arbitrage Pricing Theory by Ross (1976) (hereafter APT) become known as an alternative model that perhaps prevail over the issues related to CAPM whilst keeping the critical theme of the CAPM. The APT is considered as an alternate of the CAPM because its scope is broader than CAPM and it has less constrained assumptions. Among the new and modern approaches APT is one to determine asset's pricing and it's mainly focuses on the rule of one price which imply that items with similar features cannot be sold at different prices. CAPM considers market risk as the only influential factor in the determination of required equity return, while APT does not. APT assumes that there are different factors other than market risk that can affect portfolio return including some microeconomic, company specific, statistical and behavioral factors.

By using APT numbers of anomalies have been identified in existing literature. Basu (1977) in his study observes that equities with low P/E ratio earn higher returns in comparison to equities with high P/E ratios. Similarly, Banz (1981) finds that on the basis of risk adjustment the small equities portfolio with low BE/ME always perform better than large equities portfolio with high BE/ME.

Reinganum (1981) in his study, addresses the capability of APT to account the variations in required returns of both high and low ME firms that may perhaps not been described by CAPM. Antoniou (1981) also in his study on London Stock Exchange (LSE) identifies the factors that influence the return of equities. Chao et. al. (1986) while testing the APT in an international scenario find substantial results. In the same way Aneez and Yonezawa (2003) studied Russian and US equity markets with the help of APT. The validity of APT in Pakistani markets has tested by Iqbal et. al. (2012). They use various economic factors in their study and also determine some pertinent economic factors in describing discrepancies in equity returns. They find considerable results that confirm validity of APT in forecasting future equity returns.

The APT is tested emperically in numerous capital markets of the world and also received criticism by various researchers. Shanken (1985) in disagreement with Ross, states that the assumptions employ by APT are so unclear that it is impractical to obtain accurate pricing relationship with them. He further argues that all the previous APT testing's simply tested the model in equilibrium condition. As a result, debate is started considering the reality of certain major perimeters of the empirical verifications of APT, similar to CAPM.

The agency theory is an assumption of the association between principals and agents in business. Agency theory is primarily concerned with resolving problems exist in agency relationships; between principals (such as shareholders) and agents of the principals (for example, company executives). The two issues that agency theory deals with are: 1. The desires or goals of the principal and agent are in conflict, and the principal is unable to verify (because it is difficult and/or expensive to do so) what the agent is actually doing; and 2. The principal and agent have different attitudes towards risk taking. Due to different risk tolerance, the principal and agent may each be willing to take different actions, which later on lead to agency conflicts.

During last few decades the asset's pricing concept has changed considerably. Numerous important risk factors have been identified that can explain the cross-sectional discrepancies in return. Without a doubt, the empirical researchers have

identified various other factors than the market's beta (i.e. systematic risk), which are very useful in explaining the discrepancies in cross-sectional portfolio return.

The most well-known among factor based asset pricing models is the Fama and French (1992) 3-factor model. This model suggests that equity returns are define by market premium, size premium and value premium. For the first time Fama and French (1992) find that E/P, size, leverage and BTM ratio of stocks have significant high explanatory power in explaining the variations of stock returns. They explained that pricing of the stocks is determined through these factors. According to Fama and French (1998) size and BTM factor's affects are specific to countries and applying these factors internationally on individual equity markets can have different results. In this regard, this study is conducted to check the validity of these factors in the equity market of Pakistan which is an emerging stock market and also to examine the effect of APT by using F&F three factor model.

The theories or suppositions of classical finance do not match the facts. For example, the actual market data cannot confirm the belief that the efficient market hypotheses followed a random walk. Moreover, some formation in the dynamics of economic variables stands, it is not a real representation of the economy. The practical way of starting to develop a theory, that match reality is observing the agent's conduct in the economy either experimentally or empirically (e.g., looking at individual portfolios). Wishful thinking that underlies the efficient market hypothesis of complete rationality may be quite off the mark.

Sceptical researchers regard an investors' rationality assumption, a failure of rational expectation theories. Which results in considering well-established behavioral biases in asset pricing models helping to describe abnormal behaviors of capital markets? A more realistic explanation of agents' behavior in determining the cross-sectional discrepancies in returns is proposed by behavioural finance finding it to be an essential move in understanding, the selection of portfolios and implementation of the trading strategies by investors in the market. The "limit to arbitrage" and "beliefs and preferences" are the two building blocks of behavioural finance.

The model that describes agent's rationality in showing consistent beliefs is the traditional finance approach in understanding asset pricing. In contrast, behavioral finance suggests a number of essentials to understand how agents move away from rational conduct and due to investor's irrationality anomalies are created. Therefore, behavioral finance offers more practical analysis of agent conduct and its effect on asset pricing. In addition, it also helps investors to understand the agent's interaction with the market and its effect. The demands of individual investors are not alike to institutional investors in a market and the agent principal conflict stems from the core of this inconsistency (Chughtai, 2017). Significant effects on prices in equity markets are caused by delegated portfolio management by institutional investors. Therefore, it generates the need to take into account the agency conflict in asset pricing models (Brennan & Li, 2008).

Investors classify assets into different categories while making investment decisions e.g. large versus small capitalization stocks, value verses growth stocks, etc. These asset classifications are known as investment styles. Instead of individual securities this phenomenon focuses on the allocation of asset among different classes of stocks. A particular asset class owns different features from another asset class (Chughtai, 2017). Both individual and institutional investor thoroughly investigates the asset classes for particular reasons. It makes information processing easier being the major reason of this classification (Mullainathan & Thaler, 2000).This classification with respect to different investment styles also helps investors to evaluate performance of professional money managers (Sharpe, 1992).

1.3 Problem Statement

Existing research shows that the multifactor model do exceptionally well in expressing the cross-section of equity returns (Fama & French, 2004). Continuous efforts are being made to find out an asset pricing model that performs better by accommodating all necessary factors that can influence the equity returns. This leads the interest of researchers to study the agency effects on asset pricing, most of the previous studies on agency effects conducted in developed countries like US

and European countries and findings of those studies are still not been tested in Pakistan. Pakistan's equity market is passing through a transitional phase and come up as an emerging market in the region. This agency-based asset pricing model is not yet tested in Pakistan and its repercussions are yet to be known. To the best of my knowledge this is the pioneer study in this regard to test the validity of agency-based asset pricing model in Pakistan's equity market. The basic motivation behind this study is to extend the work of Blitz (2014) in an emerging Asian equity market.

1.4 Research Questions

- Can existing asset-pricing models suitable for equity valuation in Pakistan's equity market?
- Can the agency-based asset pricing model explain the equity returns of Pakistan's equity market?

1.5 Research Objectives

The basic objective of this study is to assess the pricing ability of the existing models those include CAPM, F&F 3 Factor Model and Blitz newly proposed Agency-Based asset pricing model.

Specifically the following objective of study is identified.

- To examine, the impact of size and value premiums on equity returns in agency-based asset pricing model.

1.6 Significance of the Study

Asset pricing is certainly the most discussed part of financial markets and as the global financial horizon is expanding asset pricing is becoming more and more

significant. Pakistan is an emerging stock market and therefore it has a great attraction for both foreign and local investors. During last few years there is a significant increase in local and foreign investments in Pakistan's equity market, asking for more information from different perspectives regarding this equity market. This study contributes by providing further empirical evidence regarding emerging Asian market. Its main focus is the direct comparison between effectiveness of Fama and French (1993) 3 factor model and Blitz (2014) Agency-Based asset pricing model in explaining the cross section of stock returns.

Agency based asset pricing with respect to equity returns is new domain that is being explored. Blitz (2014) is the first to study this in US market. The empirical evidence of developing and emerging markets is generally missing in this context. The Pakistan context is different from other developed country settings such as the United States and other European countries which have been the focus of previous literature, because corporate financial policies are less robust and more informal in Pakistan.

This study compares the performance of small vs big size companies along with value equities vs growth equities in Pakistan's equity market. This is significant not only from theoretical point of view, but practically as well for investors in Pakistani equity market. This study check the validity of existing models that are CAPM, F&F 3-Factor model and compares it with newly proposed Blitz Agency-Based asset pricing model. Finally, this study suggests the most suitable model of asset pricing for Pakistan's equity market.

1.7 Organization of the Study

This study organizes as chapter-1 introduces the motivation of the study. Chapter-2 gives insight of existing literature and their findings. Chapter-3 comprises of data description and methodology. Chapter-4 describes the results and findings of study. Chapter-5 discusses the conclusion, limitations and future research directions.

Chapter 2

Literature Review

Finance has become a scientific discipline since the publication of Sharpe (1964) paper on CAPM that is the first model which describes and quantifies capital market risk. With the introduction of CAPM, a new debate has started about premium demanded by investors holding risky securities and is termed as market premium. CAPM for a single period suggests a simple linear relationship between the market risk and return of the equity. The basic objective of the CAPM is, that all investors invest in optimal portfolios with lower risk and higher return expectations. CAPM links the return and risk linearly i.e. equity with high risk yields high returns and with low risk earns less returns. The only factor that explains the returns is market premium. Later on Black (1972) finds that the security market line (SML) is flatter than suggested by CAPM of Sharpe (1964) and Linter (1965). The findings of black are inconsistent with standard CAPM and shows its weaknesses. On the other hand, various other researchers also reported anomalies based on different firm based variables other than market premium.

Banz (1981) argues that stock of companies with small market capitalization performs better than those with large market capitalization and names it a size premium. He investigates the relationship between market value of common stock and return. The undertaken study contains all common stocks of US firms listed at NYSE for the period 1926 to 1975. Findings indicate that smaller size firms have higher risk adjusted returns than larger size firms. The size effect persists for the last four decades and, it is observed that CAPM is mis-specified during

that period. It is examined that size effect is non-linear in nature. It is observed that a little difference exists between average returns of large firms and average size firms. According to Klien and Bawa (1977), higher returns of small firms might be due to the lack of information about small firms and it leads to limited diversification and to higher returns from the undesirable stocks of small firms.

Reinganum (1981) investigates whether APT predicts the difference in both large firms and small firms average returns, that is not captured by CAPM. Chen (1983) compares APT and CAPM and report contrary results with Reinganum (1981) findings. Results of studies conducted by Cho et al. (1986) and Conor and Korajczyk (1988) support APT than that of CAPM, by employing principal component model and factor analysis. Cook and Rozeff (1984) study the negative impact of size and P/E effect in NYSE stock returns. The undertaken study uses, Basu (1977) and Banz (1981) methodology for period of 1964-1981. This study suggests that size effect has an advantage over the P/E effect and this is inconsistent with Reinganum (1981) and Basu (1983).

Stoll & Whaley (1983) state that there is no small firm's effect if we do not consider transaction cost; actually, they discover an opposite relationship between small and large firms, when they consider transaction cost, the large firms do better than small firms. What Stoll & Whaley (1983) find in their study is that the firm's size effect exists, but with reverse effect where large firms rather than smaller ones showed positive excess returns. These outcomes are based on one-month holding period and transaction costs afterwards, as returns are evaluated monthly. At the same time as the holding period is increased the small firm effect seems to recover, but not to a degree which makes it factually significant (Stoll & Whaley, 1983).

Schultz (1983) reconsiders the Stoll & Whaley (1983) work but reduces the size of the firms included and increases the transaction costs. He concludes that the transaction cost cannot encourage the abolition of the small firm anomaly as he found that small firms have abnormal returns even in one month period, when a January month is incorporated. Therefore, a counter argument put forward concerning the transaction cost's ability to eradicate the small firm effect and an additional confirmation of the January effect is provided.

Proposing a theoretical model and relating expected returns to increasing bid-ask spread (Amihud & Mendelson, 1986) arguing that an investor needs to be recompensed for expected trading cost. In contrast a study states that the differentiation of transaction costs between smaller and larger firms cannot solely explain the size effect (Schultz 1983). According to Coleman (1997), considering market capitalization as a measure of firm's size is a misleading explanation of market returns because normally investor has an impression that the firms with larger capitalization lead to earn higher returns in contrast to firms with low capital.

French et al. (1987) investigates risk and return relationship by using GARCH and ARIMA model for the period of 1928-1984 in NYSE. The study reports that volatility and stock returns have inverse relation. In contrast market risk is positively related with beta while, preceding studies reveal that there is no appropriate model for estimating risk effect. Fama and French (1992) study size and BTM equity jointly to capture the cross sectional variation in stocks returns associated with market beta, size, leverage, B/M equity and EPS ratio.

Chan and Chen (1988) look into the suggested firm size anomaly and find that the capability of firm's size to explain the returns is not captured by the CAPM, but it can be explained by the unconditional beta measure and a bigger data sample. Chan and Chen (1988) using the unconditional beta for five and 34 years to measure the abnormal returns of small company stocks, find that, the small firm effect abolished as 34 years are used to assess the unconditional beta, whereas, the effect does not disappears with a five year sample. Therefore, the sample size used is highly relevant when used with unconditional CAPM to eliminate the firm size's ability to explain the returns that CAPM is unable to measure.

Fama and French (1993) further extends their study to five factors comprising market effect, size effect; value effect, term effect and default effect by using time series regression approach. Furthermore, the undertaken study is extended to bonds and stocks of listed companies on NYSE, Market effect, size effect and the value effect are found significant in case of stocks and term effect and default effect are found significant in case of bonds. Based on findings of their study, Fama and French (1993) proposes a three factor asset pricing model for stocks that consist

of market, size, and the value effect. Three factors model is an extension of the CAPM. The size effect predicts that firms having low market capitalization earn higher average returns than that of large size firms. The value effect indicates that firms with higher B/M ration have higher returns than that of lower B/M ratio firms.

Herrera and Lockwood (1994) investigate the firms listed at Mexican stock exchange and report negative relationship between size and stocks returns. In addition, Berk (1997) argues that small stocks may not outperform big stocks when, size factor is considered. Fama and French (1995) compare the characteristics of low values firms with high values firms and find that low B/M firms have sustained profit than that of high firms, which have persistent distress over the study period. Findings suggest HMl as proxy for distress in three-factor model. Furthermore, weak performing firms have low earnings that lead to high B/M and positive slopes on HML and good performing firms have high earnings that causes to low B/M ration and negative slopes on HML.

Fama and French (1998) present further substantial evidence by testing the F&F 3 factor model in various equity markets for the period 1975-1995. This study finds that 12 out of 13 markets they tested witness an annual effect of minimum 7.68% to value stocks, whereas significant BE/ME betas are observed in seven markets. Daniel and Titman (1997) in disagreement with Fama and French (1992, 1993, 1996) has suggested that the high returns related to size and value factors cannot be viewed as compensation for factor risk. Daniel et al. (1997) explore the impact of factor loadings on stock returns for the period 1973-1993 and state that expected required returns are not a loading function on risk factors that are identified by F&F.

Halliwell, Heaney and Sawicki (1999) has tested the F&F 3-factor model in Australian equity market and find results similar to Fama and French (1993). He reported that value and size effects are observed in small size firms and high B/M ratio and vice versa. Same study taken up by Connor and Sehgal (2001) in Indian stock market and found the same results regarding the size and B/M ratio.

Horowitz, Loughran and Savin (2000) analysed Japanese markets and find that firms with small capital are performing better then large capital firms and there is no evidence of size effect in that market although these results are contradictory to the findings of Chan et al (1991), who performed the same test in Japanese market. Faff (2001) hold a study on the Australian stock market for a period of five years i.e. 1996 to 1999 using monthly data and 672 observations for daily data for successive five years period. The study explores the application of three factor model in the market and focuses the size and value effect and its implications finding that there is a significant negative effect of size of the firms in the market and value effect is positively correlated with firm's performance. Lee, Chen and Rui (2001) sorted out that the expected risk is insignificant and have no influence while determining the expected returns of the stock. They applied GARCH and EGARCH Models to identify the volatility of stocks effect for a period of eight years from 1990 to 1997 in the Australian market.

Faff (2001) uses one-step multivariate test model to analyse the stocks in Australian market finding a significant positive relationship between expected risk and the expected outcomes. The results for the studies of Elsas, Shaer and Theissen (2003) for the period of 35 years from 1960 to 1995 in the German market are also consistent with those of Faff (2001), reporting some significant correlation between the attached risk and return of stocks.

Giffin and Lemmon (2002) study the non-financial firms in NYSE market for the period 1965 to 1996 and find the significant effect of value and expected risk on the returns of stock in American companies. The study applied the Fama and Macbeth (1973) methodology and results suggest that extreme high risk is positively related to the returns and low risk bearing stocks rewards less in these markets. The study further explored the difference between high and low B/M stocks and suggests that there is a significant influence of the value of B/M on returns.

Lam (2002) uses Fama and Macbeth (1973) regression model to analyse the Hong Kong stock market taking a ten year period from 1980 to 1997 under consideration. The study explored the correlation of stock with the leverage, BTM Ratio and earning to price ratio. The study reports a significant relationship and positive

influence of earning price ratio and BTM ratio on the equity returns. The positive correlation of stocks with size reported in the study is not in line with Fama and French (1992) who declared negative effect of size on the returns associated with the stocks. The small-cap firms are priced in Germany and France and in UK the large-cap firms are priced as high ranks. Malin and Veeraraghavan (2004) explain the volatility of stocks and its influence on the equity returns finding some positive relationship between these variables.

Drew, Naughtan and Veeraraghavan (2003) while analysing Shangai stock market explore the possibility of using F&F three-factor model to explain risk and return relationship. The earlier studies of Fama and French (1996), Drew and Veeraraghavan (2002), states that the large firms report high returns over time but this study find that beta is not the only measure that describe variations in equity returns but there are some others as well. The results discover that small size growing firms generate higher returns than larger ones.

Ali, Hwang and Trombley (2003) study the phenomenon of arbitrage risk and effect of firms with high and low value on the stocks in the American NYSE and AMEX markets for 1976-1997 period. Using Fama and Macbeth (1973) regression model, the study find that mispriced stock lead to BTM anomaly and taking into consideration the investor sophistication and arbitrage risk the returns become more predictable and strongly correlated to the risk.

Marshall and Young (2003) explore the Australian market to find out the influence of liquidity, risk and size using cross sections correlated time wise autoregressive (CSTA) model and Unrelated Regression (UR) model. Market value is taken as the proxy for size measure and turnover, bid-ask spread and amortized spread are used as the proxies for liquidity. The study suggests that return on equity is inversely correlated with liquidity and size in the Australian equity market.

Daniel et al. (2004) report significant size and value effect in cross-section regression model and insignificant market effect in CAPM settings in UK equity market in two different setups, one before separation and other after making separation in up and down markets. The study also applied the Pettengill et al. (1995) model

and declares some significant market effect, insignificant size effect and unchanged value effect under same settings.

Tang and Shum (2004) study the Singapore market, separating the up market and down market settings as held by Daniel et al. (2004) in the UK market. The results report significantly positive relationship between risk and returns in up market and an inverse relation in down markets. Similarly, León, Nave and Rubio (2007) determined the same results in different European markets using MIDAS, which is one of the better technique to explore the samples.

Guant (2004) also applied Fama & Macbeth (1973) methodology to investigate the influence of large cap and small cap firms on returns in the Australian markets. They also explore the effect of B/M ration on equity returns for the period of 1991-2000. Their result are consistent with the study of Fama and French (1993) showing positive relationship of size on returns and high with risk high returns for small caps while low returns and lower risk for large cap firms.

Guan et al. (2004) investigate the behaviour of firms in NASDAQ, NYSE and AMEX markets using stable beta, B/M ratio and price earnings ratio for a period of 1967-1997. The study suggest that when CAPM declares some unusual results it supports the argument that there are other factors i.e. beta anomaly, size anomaly, value anomaly or may be some other factors affecting the expected returns of the stocks.

Djajadikerta and Nartea (2005) hold a study in New Zealand equity market taking into consideration the three factors Fama and French (1973) methodology to investigate the effect of size and value on returns using Fama and Macbeth (1973) regression model. They suggest a lower influence of value anomaly and larger effect of size of the firm on the returns.

Estrada and Serra (2005) conduct a comprehensive study using many different factors that affect the expected returns on stock and find some significant positive influence of downside risk on returns. However, the small effect of value and size was also declared through this study. Rehman, Betan and Alam (2006) use risk, size and value measure to explain the returns on stock and find a significant positive relationship for the variables in the less developed market of Bangladesh.

Fama and French (2006) explain value premium in US stock return and results indicates that the stocks having low B/M ratio can earn low return as compare to the stocks having high B/M ratio. This study provides that the expected returns are significantly explained by SMB and HML factors. Sharma and Mehta (2013) used Fama and French (1993) suggested the three factor model on Indian Stock Market and explain the behaviour of return of all portfolios. The study provide that the market factor cannot explain the behaviour of the stock but the behaviour of returns of stocks has greatly described by the factors of market with value(B/M ratio) and size factor.

Houge and Lughran (2006) use F&F three factor model point that the big companies have low returns than the small companies and the low B/M ratio have low returns than the high B/M ratio stocks value. Fama & French propose that size and value premium is proxy for risk. Results indicate that there is no significant evidence in historical value premium of style index of Russell 3000, style index of S&P 500, style indexes and big cap companies.

The non-financial sector of Pakistan is studied by (Mirza & Shahid, 2008). They analyse the validity of F&F 3F model from 2003 to 2007 and reported the significant results of size and value premiums in Karachi Stock Exchange (here onward KSE) for two portfolios out of six. Similarly Khan (2012) investigate the impact of P/E and value factors on equities return of KSE for the period of 2001-2006 and found the insignificant presence of both explanatory variables, which means these variables are not priced in equities returns of Pakistan equity market.

Senthilkumar (2009) conducts a study in Indian stock market to examine the size and value factor's effect on equity returns for the period of 2002 to 2008 by employing Fama and Macbeth (1973) regression. They find significant relationship between size and average returns. The results of this study show that size and B/M equity are priced in Indian equity market. This study also finds that small firms have higher returns as compared to big firms furthermore; B/M equity has a robust part in explaining stock returns.

Falkenstein (2009) suggests a model which states that risk is not only un-priced in cross-sections of equities returns, but also un-priced in general. This approach

based on the presumption that investors have mostly derive utility not from absolute returns, but from the level of others returns. In other words, rather than greedy, investors are better described as being envious. Additionally Falkenstein's model implies that the equity risk premia should be zero by assuming that comparative utility preferences do not only apply to delegated portfolios managers, but to all investors.

Another study conducted by Homsud et al. (2009) to check the validity of CAPM and FF 3F model in Thailand stock exchange for the period of 2002 to 2007. Their study uses data of 421 firms by dividing it into six clusters. The results reveal that predictive power of three factor model is very strong in Thailand stock market as compare to CAPM. Zhang and Whilborg (2010) employ both conventional and conditional CAPM in their study to analyse the relation between market risk and security returns for six European emerging markets. They use 1,131 firms as a sample for the period of 1996-2006 and found considerable relationship between equity returns and beta. On the basis of their findings they suggested that beta is considered as a good measure of risk for investors. It is also observed that CAPM has more usefulness in domestic level than internationally.

O'Brien, Brailsford and Guant (2010) conduct a study in Australian Stock Exchange by employing a large data of 300 firms of 24 years period. They divide the sample in large, medium and small portfolios on the basis of market capital (size) and BE/ME. They used GMM and multivariate regression for analysis and find significant negative relationship of size variable with stock returns whereas BE/ME has significant and positive relationship. Van Dijk (2011) find similar results by employing the data of small cap companies listed on NYSE for forty years period. The results show that size effect is not linear but present in smaller firms and also the effect is not consistent in different periods.

Hassan and Javed (2011) study the relationship among size, value and market effect on returns in Pakistani equity market. The study examines 250 firms listed at Karachi stock exchange for the period 2000-2007. Results indicate that value effect is significantly and positively related with all portfolios except low B/M

stocks outperform low B/M stocks. Size effect is significantly and positively related with small portfolio returns.

Fama and French (2012) study the 3 Factor model in four regions of the world to confirm the impact of size, BE/ME and momentum with risk adjusted returns in 23 countries of the world. Their results showed that size and value premiums are significant in all regions of the world except Japan where results are insignificant.

Khan, Ali and Hassan (2012) explored the effect of size premium and leverage premium by using market capitalization and B/M value respectively in KSE by employ a data of 200 stocks from 2001 to 2007. They reported the significant and positive results for the size premium while insignificant results for leverage premium. Their results are in line with other studies in this area that positive and significant relation between size and stock return.

The explanations for the presence of size effect are different in bahavioral finance school of thought than that of standard finance. Chan and Chen (1991) state that investor perceives small firm as weak performers due to low capitalization and therefore generally inclined to invest in larger equities. Lakonishok, Shleifer and Vishny (1992) state that in relation to the agency concerns it is not easy for professional equity managers to justify the investment in small stocks. In addition, small firms have less information accessibility. Merton (1987) while examining big size effect argues that prominent equities with higher capital base are expected to earn high returns. Moreover, degree of size effect additionally relies on various other factors such as trading mechanisms, efficiency of equity markets, investor types and market micro-structures.

Brennan, Cheng and Li (2012) formally derive an alternative asset pricing model in the presence of delegated portfolio management. They assume that there are two types of investors simultaneously present in the equity market. First, direct investors i.e. individuals who directly invest on their own and are mean-variance optimizers and second, professional equity managers (agents) who manage portfolios on other investor's behalf and are assessed according to their return generating capabilities with reference to a specific benchmark portfolio. Their model is quite general, allowing, for example, for the specification of benchmark portfolios for

evaluating agents (e.g., the S&P 500 Index) that are different from the market portfolio. In their empirical tests they focus on the pricing effects that may arise from this particular aspect, concluding that such effects are, in fact, too small to be detectable.

The reason of this chapter is to present in-depth review of asset pricing literature. It is observed from earlier literature, it is observed that the original CAPM is considered as a weaker model in explaining equity returns specifically in Pakistani equity market. Further, size and BE/ME is considered as priced risk factors in F&F (1993) model and to challenge CAPM they provide strong arguments. However, mixed evidence is found in literature on the significance of size and value factors. Latest additions in asset pricing literature start a discussion whether these variables are economy specific or global (Griffin et al. 2010; Fama & French, 2014).

In spite of CAPM's immense popularity among researchers, this study is aimed to produce a practical re-evaluation of model in Pakistani market by considering a CAPM's weakness in explaining cross-sectional return variations in Pakistani equity market.

Most importantly this study further contributes in examining the effectiveness of existing asset pricing models i.e. CAPM and F&F 3F model along with Blitz agency-aased asset pricing model in explaining expected portfolios returns.

Chapter 3

Data and Methodology

3.1 Data Description

In this study I used monthly closing prices of 84 non financial firms that are listed at Pakistan Stock Exchange (PSX) for the period of 2002 to 2017. Rationale behind selecting 84 companies is that not many companies are regularly traded in equity market. Hence choosing large sample may leads to inclusion of inactive companies.

The companies are selected on the basis of PSX 100 indexed companies and it must be continuously listed at KSE during the study period. Also both financial and market data is available for the selected firms for whole study period.

Stocks are required to have minimum of 36 monthly returns when calculating stock's beta. It means observations for beta calculation are available from July 2005 onwards. This condition ensures accurate beta estimation and finally only those firms are included in sample that has positive BV/MV. Fama (1996) states that for analysis a portfolio must contain minimum four stocks. Whereas, this study has a minimum 21 stocks in a portfolio.

Sample of current study consists of non financial firms. The reason to consider only non financial firms is the accounting period's difference. Which is in case of financial firm, closes at the end of December, whereas in non financial firm, accounting period closes at end of June. Moreover, the capital structure of both

financial and nonfinancial firms is different, because financial firms are more leveraged and they have higher sensitivity towards financial risk, so their inclusion may lead to wrong data results.

Monthly stocks prices are taken from website of Business Recorder. Index and financial data are obtained from Karachi Stock exchange, whereas, monthly risk free rate data is taken from State Bank of Pakistan. These are considered as reliable sources of information.

The shares prices are taken as closing prices on the last trading day of month t. Monthly basis returns are calculated on from these prices as under.

$$R_{pt} = \ln\left(\frac{P_t}{P_{t-1}}\right) \tag{3.1}$$

Where R_{pt} is monthly portfolio's return, P_t is a price of equity at month t, whereas P_{t-1} is price of equity at previous month. The treasury bills rate of return has been considered as a risk-free rate. Therefore we considered 6 months T-bill rates as a proxy for risk free rate and adjusted to the monthly rate of return as they are annualized rates. For adjustment purpose I divide it by 12 to obtain the monthly T-bills figure so that it becomes at par to the other stated variables.

3.2 Measurement of Variables

The variables of Market size and value are calculated as under:

3.2.1 Size

In literature, size is measured by using Total Assets or Market Capitalization or Sales. This study uses market capitalization as proxy for size variable as F&F (1992,1993) and it is measured by using following formula:

$$\text{Size} = \text{Market Capitalization} = \text{No. of outsg. shares} \times \text{Market Price of Share} \tag{3.2}$$

3.2.2 Value

Book to market ratio is needed for sorting on the basis of value premium F&F (1992,1993,1996), ratio is calculated as under:

$$\text{BMR} = \frac{\text{Book value of Equity}}{\text{Market Value of Equity}} \tag{3.3}$$

where,

$$\text{Book Value of Equity} = \text{Total Equity on Balance Sheet date}$$

$$\text{Market Value of Equity} = \text{No. of shares} \times \text{MPS} \tag{3.4}$$

3.3 Methodology

Capital Asset Pricing Model determines market premium is the only factor that influences the return of a stock, but in contrast Arbitrage Pricing Theory states, there are various other factors that influence the returns. Similarly, in continuation Fama and French (1992, 1993) propose 3-factor model by adding value and size premium with market premium. To explore the effect of these factors on equity return, the methodology applied by F&F in their 3-factor model is adopted and same is applied for Blitz (2014) alternative agency based model which we are testing in this study.

In this study, I tested four asset-pricing models and analysed their significance. The Fama and MecBeth regression has first applied on a single-factor model, then

Blitz alternative single-factor model, after that on F&F three-factor model and in the end on Blitz alternative 3-factor model.

3.4 Portfolio Construction

3.4.1 Size Sorted Portfolios

For size sorted portfolios, market capitalization of each company is calculated at the end of June for year t-1 and then these companies are sorted on the basis of market capitalization in ascending order. Smallest 42 companies on the top are grouped as "S" and largest 42 are grouped as "B" to form size sorted portfolios. Average monthly returns have been calculated for both "S" and "B" portfolios by the formula given below:

$$B = \frac{\sum R_i}{n} \quad \text{Where} \quad R_i = \text{Return of Big Companies} \tag{3.5}$$

$$S = \frac{\sum R_i}{n} \quad \text{Where} \quad R_i = \text{Return of Small Companies} \tag{3.6}$$

3.4.2 Value Sorted Portfolio

For this B/M ratio is calculated for each stock and then the sample of forty two big (B) companies is further sorted in descending order on the basis of B/M (BE/ME) ratio to create value sorted portfolio. Twenty two big companies with high BE/ME ratio are named as "B/H" and twenty two big companies with low BE/ME ratio are named as "B/L". After that average returns for both "B/H" and "B/L" portfolios are calculated.

Likewise, the sample of forty two small (S) companies is again sorted on high and low BE/ME ratio basis to create value sorted portfolio. Twenty two small companies with high BE/ME ratio are named as "SH" and twenty two small companies with low BE/ME ratio are named as "SL". Average monthly returns for "SH" and "SL" portfolios are calculated.

The above mentioned method is repeated for year 2005 to year 2017. It is worth mentioning here that stated size and value sorted portfolio are constructed as one year lagged $t-1$ period to examine the information has priced in returns of the next year t.

3.5 Variable Construction

Firstly, average monthly returns of all six sub portfolios S, B, SH, SL, BH and BL are calculated and after that these average returns employ to construct two factors as size premium factor and value premium factor.

We adopted the same approach in this study for construction of size and value premium factors, as adopted by Fama & French (1992), Hassan & Javed, (2008).

3.5.1 Market Premium

Market premium (MKT) is the excess return of market index over the risk free rate. It is calculates as below.

$$\text{MTK} = R_m - R_f$$

where

R_m = Market index return

R_f = Risk free rate

3.5.2 Size Premium (SMB)

$$\begin{aligned} \text{Size premium} &= \text{SMB(Small} - \text{Big)} \\ &= 1/2 \times [(S/H - B/H) + (S/L - B/L)] \end{aligned} \tag{3.7}$$

3.5.3 Value Premium (HML)

$$\begin{aligned} \text{Value premium} &= \text{HML(High book-to-market} - \text{Low book-to-market)} \\ &= 1/2 \times [(S/H - S/L) + (B/H - B/L)] \end{aligned} \tag{3.8}$$

3.6 Model Specification

3.6.1 Single Factor Model (CAPM) & Blitz Agency-Based Model

The model is shown econometrically as:

$$R_{pt} - R_{ft} = \alpha + \beta_i(R_{mt} - R_{ft}) + \varepsilon_t \tag{3.9}$$

where;

R_{pt} - R_{ft} = Portfolio returns "i" for period "t" in excess of risk free return.

R_{mt} - R_{ft} = Market returns for period "t" in excess of risk free return.

β_i = Factor beta

ε_t = Error term

$$R_{pt} - E(R_m) = \alpha + \beta_i(R_{mt} - E(R_m)) + \varepsilon_t \tag{3.10}$$

where;

R_{pt} = The expected return of portfolio at time t

$E(R_m)$ = Excess return on market portfolio (calculated by taking sum of average returns of all companies having beta greater than 1).

R_{mt} = Return of market at time t

3.6.2 Fama and French 3-Factor Model & Blitz Alternative 3-Factor Model

Fama and French (1993) in their study proposed three factors model also known as multi factor model in enhancement to the CAPM, by including size and value factors based on the grounds that these factors reflect substitutes for additional priced risk factors. This results in the following model specification:

$$R_{pt} - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t \tag{3.11}$$

where;

R_{pt} = The expected return on portfolio at time t

R_{ft} = Return on risk free securities at time t

R_{mt} = Market return at time t

SMB_t = $R_{Small,t}$ - $R_{Big,t}$ at time t

HML_t = $R_{high\ BMR,t}$ - $R_{low\ BMR,t}$

β_i = Factor beta

ε_t = Error term

In same manner, Blitz (2014) in his study proposed an agency-based 3-factor model, by enhancing (3) with the same size and value factors, but based on the argument that these can be considered as premiums which arise because of additional agency effects involved with delegated portfolio management. This leads to the following alternative model specification:

$$R_{pt} - E(R_m) = \alpha + \beta_1(R_{mt} - E(R_m)) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t \tag{3.12}$$

where;

R_{pt} = The expected return on portfolio p at time t

$E(R_m)$ = Excess return on market portfolio (calculated by taking sum of average returns of all companies having beta greater than 1).

R_{mt} = Market return at time t

$SMB_t = R_{Small,t}$ - $R_{Big,t}$ at time t

$HML_t = R_{high\ BMR,t}$ - $R_{low\ BMR,t}$

β_i = Factor beta

ε_t = Error term

In the empirical tests we will focus entirely on a direct comparison between the Fama and French (1993) 3-factor model, as in (11), and Blitz (2014) agency-based 3-factor alternative, as in (12).

Chapter 4

Empirical Results and Discussion

4.1 Descriptive Statistics of Size and Value Sorted Portfolios

Descriptive stats are used to explain the distribution and behavior of data. Mean reflects the average values while standard deviation captures deviation from mean value. Skewness reflects the relative distribution of data while kurtosis shows flatness or peakedness in relation to normal distribution of data.

TABLE 4.1: Descriptive Statistics of Size and Value Sorted Portfolios for the Period of 2002-2017.

Variable	Mean	Median	Std. Dev.	Kurtosis	Skewness	Min	Max
P	0.007	0.013	0.068	5.412	-1.508	-0.352	0.148
S	0.010	0.014	0.071	7.586	-1.558	-0.405	0.151
B	0.004	0.012	0.070	4.389	-1.401	-0.306	0.156
SH	0.013	0.008	0.079	6.088	-0.967	-0.430	0.223
SL	0.008	0.014	0.070	6.757	-1.649	-0.381	0.142
BH	0.005	0.019	0.084	5.306	-1.355	-0.427	0.216
BL	0.009	0.007	0.051	0.032	-0.065	-0.114	0.135

Note: P shows the average return of all 84 companies in the sample. Whereas **S** and **B** portfolios show average returns of small and big companies sorted with respect to size. **SH**, **SL**, **BH** and

BL shows the average return of small companies sorted with respect to high and low book to market ratio and big companies respectively.

In table 4.1 the average risk and return of portfolio P is 0.068% and 0.007%. The average return of all small size companies in portfolio for whole study period is 1.02% and standard deviation of return is 7.07%. Similarly, average return of portfolio having big size companies is 0.38% with standard deviation of 7.02%. These results show that portfolio "S" with small size stocks earned higher return than "B" big size stocks this is because of risk return relationship as risk of small firms is higher than big stocks and these results are in line with Banz (1981). However, statistics of standard deviation tells us that the average risk of both big and small portfolios in our study is comparatively same, regardless of the fact that mean return of small firms portfolio is much higher in comparison to the large firms. Both portfolios are negatively skewed but the skewness is not significant. These portfolios have leptokurtic distribution as value of kurtosis is greater than 3. Highest return earned by small stocks portfolio is 15.56% whereas big stock portfolios earned 15.14% in a month. Moreover, maximum loss in a month incurred by small stocks portfolio is 40.52% whereas big stocks reported a maximum loss of 30.56% in a month. Above statistics of data show huge variation between mean value and minimum values of average returns. The extreme negative value of average return belongs to start of year 2009. During this short span KSE lost more than 35% of its index value and this may be due to the effect of international financial crises onto Pakistani equity market. The behavior of average return of small and big stocks is presented graphically in Figure 4.1.

When value sorted portfolios are examined, it is observed that small stocks with high BTM ratio (here onward BTM) earned higher return i.e. 12.6% as compared to big stocks with high BTM ratio which earned 5.2%. Average risk of small stocks with high BTM ratio is higher than big stocks, whereas, the same is low in case of big stocks.

Table 4.1 indicates that SH portfolio is high risk and higher return portfolio, while BH is found inefficient as it offers less return with highest level of risk among all four value sorted portfolios. However, BL is found efficient, as it offers higher

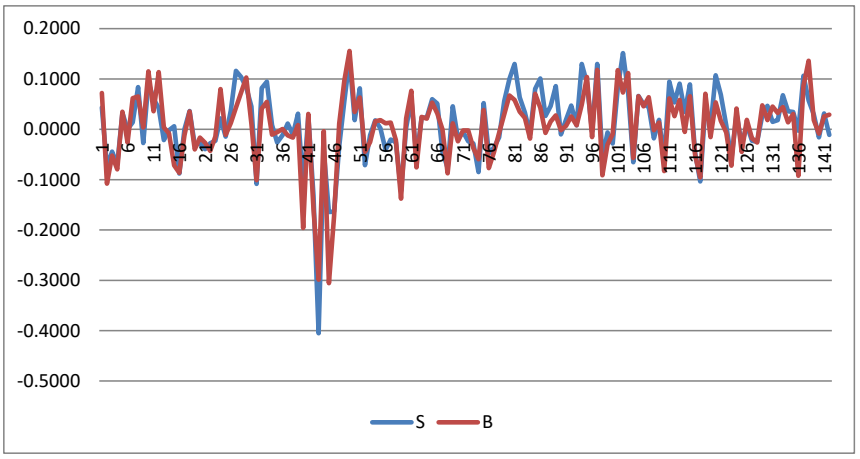

FIGURE 4.1: Average Return of Small and Big Stocks.

returns at lower level of risk. In small stocks segments high BTM stocks portfolio out performed low BTM stocks, whereas in big stocks segment it is vice versa. It is consistent with empirical work on this subject that big value companies earn lower return and stocks with high BTM ratio perform better in comparison to stocks with low BTM ratio (Statman, 1980).

The skewness of all four value sorted portfolios i.e. BH, BL, SH, and SL is negative which are in line with size stored portfolios. These portfolios are also found to have leptokurtic distribution as value of kurtosis is greater than 3 except BL which is platykurtic. The behavior of average return of high BTM and low BTM stocks is presented graphically in Figures 4.2 and 4.3.

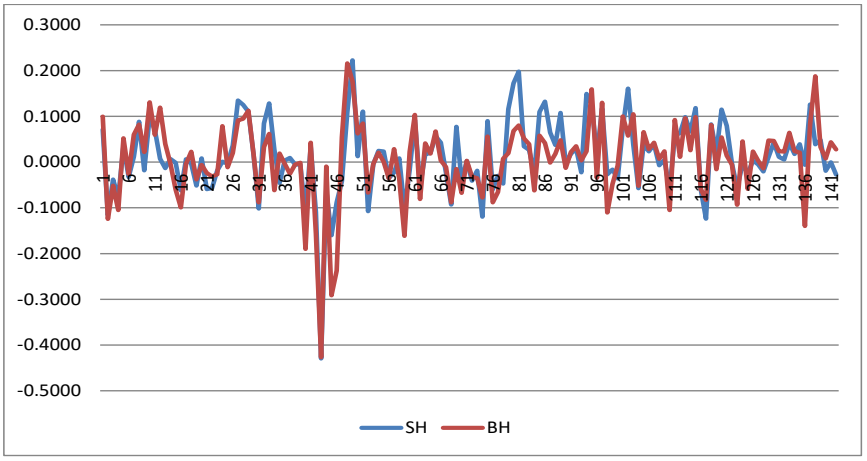

FIGURE 4.2: Average Return of High BTM Stocks.

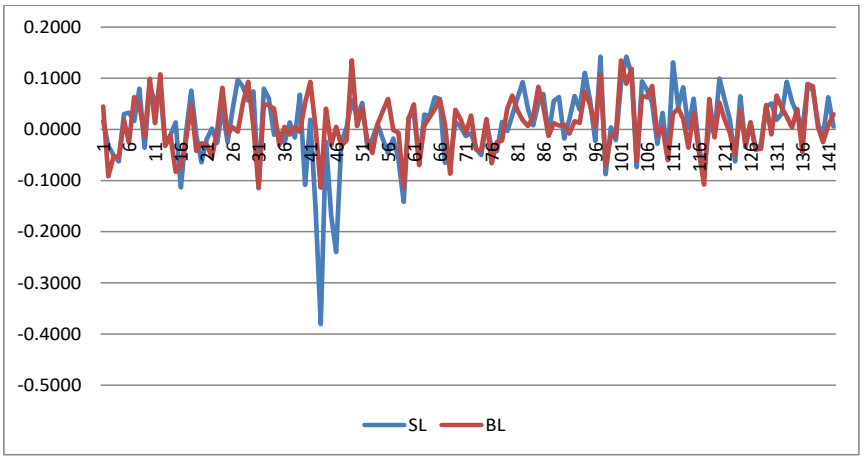

FIGURE 4.3: Average Return of Low BTM Stocks.

TABLE 4.2: Descriptive Statistics of Excess Return of Portfolios Sorted on Size and BTM with Risk Free Rate for the Period of 2002-2017.

Variable	**P**	**S**	**B**	**SH**	**SL**	**BH**	**BL**
Mean	-0.001	0.003	-0.004	0.005	0.000	-0.002	0.002
Median	0.006	0.008	0.004	0.000	0.006	0.010	-0.001
Std. Dev.	0.069	0.071	0.071	0.079	0.070	0.085	0.051
Kurtosis	5.466	7.611	4.459	6.136	6.744	5.343	0.040
Skewness	-1.525	-1.574	-1.416	-0.998	-1.648	-1.372	-0.066
Minimum	-0.362	-0.415	-0.316	-0.440	-0.391	-0.437	-0.124
Maximum	0.137	0.144	0.145	0.212	0.135	0.205	0.128

Note: **P** shows the average excess return with risk free rate of all 84 companies in the sample. **S** and **B** portfolios show average excess returns with risk free rate of small and big companies sorted with respect to size. Similarly **SH**, **SL**, **BH** and **BL** shows average excess return of small companies with high and low BTM and big companies respectively.

In table 4.2 the average risk and excess return of portfolio P is 6.9% and -0.1% which is negative. The average excess return of all small size companies in portfolio for whole study period is 0.3% and standard deviation of return is 7.1%. Similarly, average excess return of portfolio B having big size companies is -0.4% with standard deviation of 7.1%. These results show that portfolio S with small size stocks earned higher return than B big size stocks. This result is consistent with the findings of previous studies that small stocks earn higher returns as compare to big size stocks (Banz, 1981). However, standard deviation statistics tells

us that average risk of both small and big portfolios in our study is more or less same. Both portfolios are negatively skewed and these portfolios have leptokurtic distribution as value of kurtosis is greater than 3.

When value sorted portfolios are examined, it is observed that small stocks with high BTM ratio "SH" earned higher excess return i.e. 0.5% as compared to big stocks with high BTM ratio "BH" which earned -0.4%, whereas average risk of big stocks with high BTM ratio is higher than small stocks. This result is in contradiction of empirical findings and it may be due to unpredicted behavior of Paksitan's stock market, where fundamental information of companies is less available due to this speculation plays very vital role in price changes of stocks. However, "BL" is found efficient, as it offers higher returns at lower level of risk in comparison to small stocks.

The skewness of all four value sorted portfolios i.e. BH, BL, SH, and SL is negative which are in line with size sorted portfolios. These portfolios are also found to have leptokurtic distribution as value of kurtosis is greater than 3 except BL which is platykurtic.

TABLE 4.3: Descriptive Statistics of Return of Portfolios Sorted on Size and BTM in Excess of Expected Return on Market Portfolio for the Period of 2002-2017 (Agency-Based Approch).

Variable	**P'**	**S'**	**B'**	**SH'**	**SL'**	**BH'**	**BL'**
Mean	0.011	0.014	0.007	0.016	0.011	0.009	0.013
Median	0.000	0.004	0.000	0.008	0.002	0.007	0.000
Std. Dev.	0.085	0.085	0.089	0.089	0.088	0.088	0.104
Kurtosis	17.848	10.119	12.403	8.850	11.318	11.964	22.058
Skewness	3.834	3.022	4.272	2.240	3.172	2.812	5.124
Minimum	-0.166	-0.202	-0.160	-0.237	-0.227	-0.224	-0.137
Maximum	0.686	0.633	0.739	0.608	0.657	0.611	0.924

Note: **P'** shows the average return in excess of expected return on market portfolio of all 84 companies in the sample. **S'** and **B'** portfolios shows the average return in excess of expected return on market portfolio of small and big companies sorted with respect to size. Similarly **SH'**, **SL'**, **BH'** and **BL'** shows average return in excess of expected return on market portfolio

of small companies with high and low BTM and big companies respectively. While implementing agency-based approach market excess return is calculated by substituting the risk free rate R_f with expected return on market portfolio $E(R_m)$.

In table the average excess return and risk of portfolio P' is 1.1% and 8.5%. The average excess return of all small size companies in portfolio for whole study period is 1.4% and standard deviation of return is 8.5%. Similarly, average excess return of portfolio having big size companies is 0.7% with standard deviation of 8.9%. These results show that portfolio S' with small size stocks earned almost double return than B' big size stocks. This result is consistent with the finding that small stocks earn higher returns as compare to big size stocks (Banz, 1981). However, standard deviation statistics tells us that average risk of both small and big portfolios in our study is more or less same. Both portfolios are positively skewed and these portfolios have leptokurtic distribution as value of kurtosis is greater than 3.

When value sorted portfolios are examined, it is observed that small stocks with high BTM ratio SH' earned higher excess return i.e. 1.6% as compared to big stocks with high BTM ratio BH' which earned 0.9%, whereas average risk of both big stocks with high BTM ratio and small stocks is nearly same. However, in case of stocks with low BTM ratio, Big stocks with low BTM ratio BL' is found efficient, as it offers higher returns in comparison to small stocks. The skewness of all four value portfolios i.e. BH', BL', SH', and SL' is positive which are in line with size sorted portfolios. Table shows that all value sorted portfolios have leptokurtic distribution as value of kurtosis is greater than 3.

Comparison of average excess return of small and big stocks with risk free rate and expected return on market portfolio is presented graphically in Figures 4.4 and 4.5.

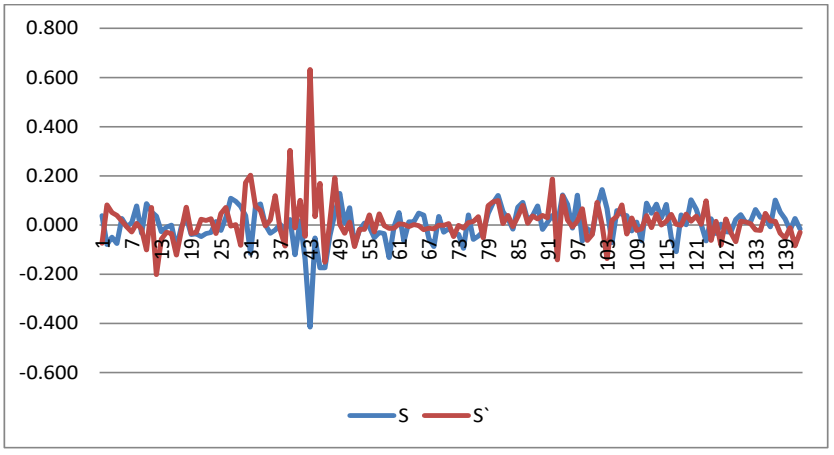

FIGURE 4.4: Comparison of Average Excess Return with R_f and $E(R_m)$ of Small Stocks.

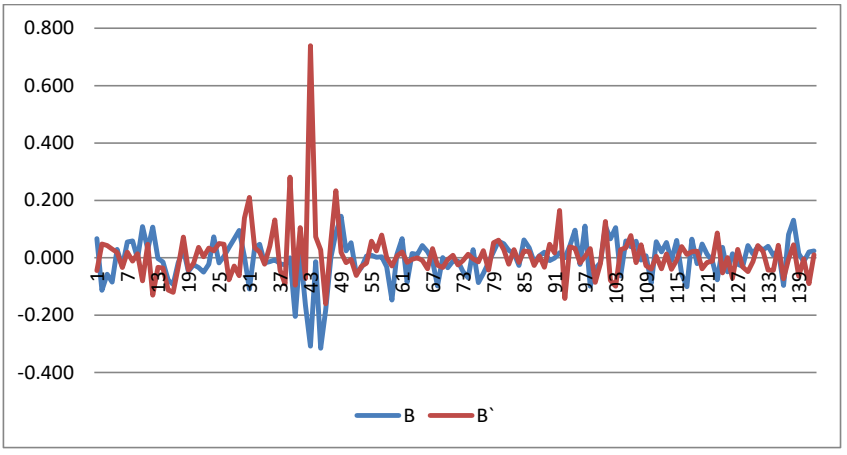

FIGURE 4.5: Comparison of Average Excess Return with R_f and $E(R_m)$ of Big Stocks.

4.2 Descriptive Statistics Comparison of F&F and Blitz Three Factors Models

Statistical properties of the variables constructed for F&F three factor model and Blitz agency-based model are reported in Table 4.4.

Note: $R_m - R_f$ is market returns in excess of risk free return. $R_m - E(R_m)$ is market return in excess of expected return on market portfolio. **SMB** and **HML** show size and value variables respectively.

TABLE 4.4: Descriptive Statistics comparison of Variables.

Variable	R_m **-** R_f	$R_m - E(R_m)$	**SMB**	**HML**
Mean	0.009	0.020	0.003	0.000
Median	0.014	0.020	0.005	-0.002
Std. Dev.	0.067	0.117	0.033	0.042
Kurtosis	7.315	7.652	1.893	4.301
Skewness	-1.628	1.169	-0.372	-0.214
Minimum	-0.372	-0.380	-0.135	-0.181
Maximum	0.188	0.676	0.090	0.171

Table 4.4 indicates that all four premiums are positive. When we compare market premium of F&F model with market premium of agency-based model, we found that market premium of agency-based model is more volatile and it also generates highest mean return i.e. 2%. It is worth mentioning that market premium of both models are higher than size and value premiums, we can say that it could be an outcome of exceptional performance of Pakistan's equity market during the study period which rises from 4000 points to more than 50000 points during the study period, which is an extraordinary movement. The third major factor according to return generation appears to be size premium followed by value premium. Except market premium of agency based model which is positive, all other three premiums are found negatively skewed. Markets and value premiums are leptokurtic whereas size premium is platykurtic in nature. Positive average HML indicate that value stocks performed better than growth stocks, whereas in case of size premium positive SMB indicates that small stocks average return is higher than big stocks.

4.3 Correlation Matrix

Table 4.5 reports correlation among three premiums discussed in study to explore the possibility of multicolinearity problem. It has been found that market premium has insignificant positive correlation with size and insignificant negative correlation is observed with value premium. Size premium is found insignificantly

TABLE 4.5: Correlation Matrix.

	R_M - R_F	**SMB**	**HML**
R_M - R_F	1		
SMB	0.486299	1	
HML	-0.72104	0.254803	1

positively associated with value premium at 95% confidence interval. The correlation reported by above sated analysis is within tolerable limit to problem of multi-co-linearity does not exist.

4.4 Regression Analysis: Fama and French Three Factor Model

TABLE 4.6: The impact of market, size and value premium on small size & value sorted portfolios

$$R_{pt} - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$$

Dependent Variable	**Intercept**	**MKT**	**SMB**	**HML**	**Adj. R^2**	**F-Stat**	**F Sig.**
P	-0.003	0.240			0.048	8.092	0.005
T statistics	-0.493	2.845					
P value	0.623	0.005					
P	-0.003	0.082	0.297	0.893	0.368	28.418	0.000
T statistics	-0.559	1.154	2.040	7.641			
P value	0.577	0.250	0.043	0.000			
S	0.000	0.277			0.062	10.307	0.002
T statistics	0.013	3.210					
P value	0.989	0.002					
S	-0.001	0.093	0.752	0.800	0.450	39.528	0.000

Dependent Variable	**Intercept**	**MKT**	**SMB**	**HML**	**Adj. R^2**	**F-Stat**	**F Sig.**
T statistics	-0.175	1.355	5.360	7.101			
P value	0.861	0.178	0.000	0.000			
SH	0.002	0.342			0.077	12.692	0.001
T statistics	0.295	3.563					
P value	0.768	0.001					
SH	0.001	0.103	0.745	1.170	0.601	71.804	0.000
T statistics	0.331	1.581	5.570	10.906			
P value	0.741	0.116	0.000	0.000			
SL	-0.002	0.213			0.034	6.021	0.015
T statistics	-0.299	2.454					
P value	0.765	0.015					
SL	-0.003	0.083	0.759	0.429	0.246	16.337	0.000
T statistics	-0.574	1.036	4.662	3.280			
P value	0.567	0.302	0.000	0.001			

Table 4.6 and 4.7 reports the results of regression analysis. Portfolios of all stocks, small stocks and big stocks are taken as dependent variable. Market premium, size premium and value premium are independent variables. Results of step wise regression are reported below in table 4.6 and 4.7.

For portfolios of all stocks, CAPM appears to be a valid model as market premium is significantly positive at 95% confidence interval and explains 4.8% of total variation in returns of portfolio of all stocks. When size premium and value premium are added they do have significant positive impact on portfolio of all stocks. It also increases the explanatory power of model.

For portfolios of small stocks (S), CAPM appears to be valid model as market premium is significantly positive at 95% confidence interval and explains only 6.2% to total variation in return of portfolio of small stocks. When size premium and value premium are added, both factors have significant positive impact on return at 95% confidence interval and explain 45% of total variation on return of portfolio of small stocks.

Now small and big stocks are sorted on BTM ratio. In case of small stocks with high BTM ratio (SH), capital asset pricing model explains only 7.7% variation in return. Market premium is significant and positive which is consistent with theory but explanatory power is relatively low. Fama and French three factor model has performed better than CAPM, as size premium and value premium are also significantly positively influencing the return. After addition the explanatory power of model increases to 60.1%. It indicates that size and value premiums are priced in case of small stocks.

In case of small stocks with low BTM ratio (SL), capital asset pricing model explains only 3.4% variation in return and market premium is significantly positive which is consistent with theory but explanatory power is very low. Fama and French three factor model is better than CAMP, as size premium and value premium are significantly positively influencing the return. The explanatory power of model is now 24.6% which indicates that size and value premiums are priced in case of small stocks.

TABLE 4.7: The impact of market, size and value premium on big size & value sorted portfolios

$$R_{pt} - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$$

Dependent Variable	**Intercept**	**MKT**	**SMB**	**HML**	**Adj. R^2**	**F-Stat**	**F Sig.**
P	-0.003	0.240			0.048	8.092	0.005
T statistics	-0.493	2.845					
P value	0.623	0.005					
P	-0.003	0.082	0.297	0.893	0.368	28.418	0.000

Dependent Variable	**Intercept**	**MKT**	**SMB**	**HML**	**Adj. R^2**	**F-Stat**	**F Sig.**
T statistics	-0.559	1.154	2.040	7.641			
P value	0.577	0.250	0.043	0.000			
B	-0.006	0.202			0.030	5.368	0.022
T statistics	-0.965	2.317					
P value	0.336	0.022					
B	-0.004	0.071	-0.158	0.987	0.329	24.042	0.000
T statistics	-0.899	0.949	-1.025	7.986			
P value	0.370	0.344	0.307	0.000			
BH	-0.005	0.271			0.039	6.729	0.010
T statistics	-0.688	2.594					
P value	0.493	0.010					
BH	-0.003	0.083	-0.241	1.429	0.479	44.279	0.000
T statistics	-0.574	1.036	-1.478	10.931			
P value	0.567	0.302	0.142	0.000			
BL	0.001	0.106			0.012	2.750	0.100
T statistics	0.164	1.658					
P value	0.870	0.100					
BL	0.001	0.103	-0.255	0.170	0.033	2.627	0.050
T statistics	0.331	1.581	-1.909	1.588			
P value	0.741	0.116	0.085	0.115			

For portfolios of big stocks (B), CAPM appears to be a valid model as market premium is significantly positive at 95% confidence interval but explains only 3%

of total variation in return of portfolios of big stocks. When size premium and value premium are added, it is observed that size has insignificant negative impact on return at 95% confidence interval whereas, value premium has significant positive impact on portfolio of big stocks and now model's explanatory power rise to 32.9% of total variation in return of portfolio of big.

In case of big stocks with high BTM ratio (BH), capital asset pricing model explains only 3.9% variation in return which is again very low, market premium is significant and positive which is consistent with theory but explanatory power is low. Fama and French three factor model is better than CAMP, as after adding value premium is significantly positively influencing the return whereas size premium has insignificant negative impact on returns. The explanatory power of model is now 24.6%. It indicates only value premium is priced in case of big stocks.

In case of big stocks with low BTM ratio (BL), capital asset pricing model again explains only 1.2% variation in return. Market premium is significant and positive which is consistent which theory but explanatory power is relatively low. When Fama and French three factor model is implemented, size premium is insignificantly negatively influencing the return, whereas value premium is also insignificant but positively influencing the return. The explanatory power of model is now 3.3% which indicates that size premium and value premium are very little priced in case of big stocks with low BTM ratio.

4.5 Regression Analysis Agency-Based Three Factor Model

Table 4.8 and 4.9 reports the results of regression analysis. Portfolios of all stocks, small stocks and big stocks are taken as dependent variable. Market premium, size premium and value premium are independent variables.

TABLE 4.8: The impact of market, size and value premium on small size & value sorted portfolios

$$R_{pt} - E(R_m) = \alpha + \beta_1(R_{mt} - E(R_m)) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$$

Dependent Variable	**Intercept**	**MKT**	**SMB**	**HML**	**Adj. R^2**	**F-Stat**	**F Sig.**
P	-0.001	0.436			0.352	78.612	0.000
T statistics	-0.179	8.866					
P value	0.858	0.000					
P	-0.006	0.597	0.448	0.548	0.481	45.107	0.000
T statistics	-0.906	11.591	2.569	3.624			
P value	0.366	0.000	0.011	0.000			
S	0.003	0.507			0.479	130.797	0.000
T statistics	0.667	11.437					
P value	0.506	0.000					
S	0.002	0.538	0.350	0.120	0.496	47.328	0.000
T statistics	0.342	11.632	2.183	0.910			
P value	0.733	0.000	0.031	0.365			
SH	0.006	0.506			0.437	110.376	0.000
T statistics	1.041	10.506					
P value	0.300	0.000					
SH	0.003	0.585	0.362	0.533	0.517	51.340	0.000
T statistics	0.572	12.356	2.206	3.944			
P value	0.569	0.000	0.029	0.000			
SL	0.001	0.507			0.449	115.770	0.000
T statistics	0.190	10.760					

Dependent Variable	**Intercept**	**MKT**	**SMB**	**HML**	**Adj. R^2**	**F-Stat**	**F Sig.**
P value	0.850	0.000					
SL	0.001	0.491	0.338	-0.293	0.467	42.193	0.000
T statistics	0.093	9.976	1.982	-2.085			
P value	0.926	0.000	0.050	0.039			

For portfolios of all stocks, agency based CAPM from now onward (A-CAPM) appears to be a valid model as market premium is significantly positive at 95% confidence interval and explains 35.2% of total variation in returns of portfolio of all stocks. When Blitz (2014) agency based three factor model implemented with size premium and value premium are added they have significant positive impact on portfolio of all stocks. It also increases the explanatory power of model to 48.1% .

For portfolios of small stocks (S), A-CAPM appears to be valid model as market premium is significantly positive at 95% confidence interval and explains only 47.9% to total variation in return of portfolio of small stocks. When size premium and value premium are added, size factor have significant positive impact on return, but value factor have insignificant positive impact. The explanatory power of model rise to 49.6% of total variation on return of portfolio of small stocks which is better than CAPM.

Now small and big stocks are sorted on BTM ratio. In case of small stocks with high BTM ratio (SH), agency based capital asset pricing model explains only 47.3% variation in return. Market premium is significant and positive which is consistent with theory. When Blitz agency based three factors model implemented it performed better than CAPM, as size premium and value premium are also significantly positively influencing the return. After addition the explanatory power of model increases to 51.7%. It indicates that size and value premiums are priced in case of small stocks.

In case of small stocks with low BTM ratio (SL), agency-based capital asset pricing model explains 44.9% variation in return and market premium is significantly positive which is consistent with theory. Blitz three factor model performs better than CAMP, as size premium is significantly positively influence the return, whereas value premium has significant negative impact on returns of portfolio SL. It indicates that HML is priced only in high BTM stocks. Therefore, we can say that value factor fails to explain returns of small stocks with low BTM and only size premium is priced in case of small stocks with low B/M ratio. The explanatory power of model is increases to 46.7% which is far more than F&F model.

TABLE 4.9: The impact of market, size and value premium on small size & value sorted portfolios

$$R_{pt} - E(R_m) = \alpha + \beta_1(R_{mt} - E(R_m)) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$$

Dependent Variable	**Intercept**	**MKT**	**SMB**	**HML**	**Adj. R^2**	**F-Stat**	**F Sig.**
P	-0.001	0.436			0.352	78.612	0.000
T statistics	-0.179	8.866					
P value	0.858	0.000					
P	-0.006	0.597	0.448	0.548	0.481	45.107	0.000
T statistics	-0.906	11.591	2.569	3.624			
P value	0.366	0.000	0.011	0.000			
B	-0.003	0.510			0.442	112.905	0.000
T statistics	-0.534	10.626					
P value	0.595	0.000					
B	-0.002	0.514	-0.574	0.280	0.484	45.001	0.000
T statistics	-0.275	10.482	-3.377	2.002			
P value	0.784	0.000	0.001	0.047			
BH	0.000	0.443			0.342	74.407	0.000
T statistics	-0.031	8.626					

Dependent Variable	**Intercept**	**MKT**	**SMB**	**HML**	**Adj. R^2**	**F-Stat**	**F Sig.**
P value	0.975	0.000					
BH	0.001	0.491	-0.662	0.707	0.463	41.592	0.000
T statistics	0.093	9.976	-3.883	5.031			
P value	0.926	0.000	0.000	0.000			
BL	-0.001	0.669			0.563	182.886	0.000
T statistics	-0.130	13.524					
P value	0.896	0.000					
BL	0.003	0.585	-0.638	-0.467	0.645	86.455	0.000
T statistics	0.572	12.356	-3.887	-3.450			
P value	0.569	0.000	0.000	0.001			

For portfolios of big stocks (B), A-CAPM appears to be a valid model as market premium is significantly positive at 95% confidence interval and explains 44.2% of total variation in return of portfolios of big stocks. When size premium and value premium are added, it is observed that size has insignificant negative impact on return at 95% confidence interval whereas, value premium has significant positive impact on portfolio of big stocks and now model's explanatory power rises to 48.4% of total variation in return of portfolio.

In case of big stocks with high BTM ratio (BH), capital asset pricing model explains only 34.2% variation in return, market premium is significant and positive which is consistent with theory. Blitz (2014) three factor model is better than CAMP, as after adding value premium is significantly positively influencing the return whereas size premium has insignificant negative impact on returns. The explanatory power of model is increases to 46.3%. It indicates only value premium is priced in case of big stocks.

In case of big stocks with low BTM ratio (BL), capital asset pricing model again explains only 56.3% variation in return. Market premium is significant and positive which is consistent which theory. When Blitz (2014) three factor model is implemented, both size and value premiums are significantly negatively influencing the returns. The explanatory power of model rises to 64.5%.

Results show that the behavior of variables varies across different portfolios. SMB is positively and significantly influence the market and all small size stocks while it is insignificant in all big size stocks. Similarly HML is significantly positively influence the return of all big size stocks except with low BTM. It indicates that SMB only priced in portfolios containing small size stocks, whereas HML is priced in stocks having high BTM while it is discounted in low BTM stocks.

4.6 Comparison between Explanatory Powers of Models

TABLE 4.10: Comparative Statement of Adj. R^2 of F&F 3F Model and Agency Based 3F Model.

Dep. Variable	**CAPM**	**Agency CAPM**	**F&F 3FM**	**Agcy. 3F Model**
P	0.048	0.352	0.368	0.481
S	0.062	0.479	0.450	0.496
B	0.030	0.442	0.329	0.484
SH	0.077	0.437	0.601	0.517
SL	0.034	0.449	0.246	0.467
BH	0.039	0.342	0.479	0.463
BL	0.012	0.563	0.033	0.645

Table 4.10 shows the values of Adjusted R squares of F&F 3 Factor Model and Blitz Agency Based Model. Comparison of the explanatory powers of traditional CAPM, F&F Three-Factor model and Blitz agency based model reveals that agency based model has higher adjusted R^2 indicating that our tested model

is better able to capture the additional information regarding returns. The results established the validity of CAPM as market premium is found significant in all portfolios but the explanatory power of model is very low. This indicates that there are also other factors exits that contribute towards the returns of portfolios.

The same argument is supported by Fama and French model where size premium and value premium are found significantly influencing market return though some evidence in contravention to theory is observed but that may be due to abnormal movements and inefficiency of the market during the period of study. The empirical evidence is consistent with theory for small stocks. However, some deviations are observed for large stocks. Our tested agency-based alternative three-factor model is performed at least as good in explaining the performance of portfolios sorted on size and BTM in comparison to F&F three factor model.

4.7 Discussion

The validity of Agency based asset pricing model is tested in Pakistan by employ CAPM, F&F three factor model and Blitz agency based three factor model to capture the relationship among market, size and value premiums. Fama and Machbeth (1973) regression is used to capture the relationship and impact of all variables in Pakistan's equity market.

The value of F statistic is significant at 95% confidence interval that shows the goodness of fit or average significance of model. All the reported models are found fit and significant to describe the association among dependent and independent variables.

In short it is observed that equity market premia is found positive and significant in all portfolios while value premia is positively significant for all portfolios except BL big size and low BM ratio. It means HML is unable to explain low BTM equities. But, this factor cannot be ignore in making investment decisions as it is useful in other portfolios returns. It has been noted that two additional factors inclusion in the model leads to increase in Adj. R^2 of the model. Likewise, size premia is found significantly and positively associated to small portfolio returns.

Whereas size premia is observed insignificant for (B) big size portfolios, BL (big size with low BTM) and BH (big size with high BTM). It means SMB is not significantly influencing the returns of big stocks. The results are in line with findings of (Hassan & Javed, 2011) in Pakistan stock exchange.

In case of agency based model, results indicate that value premium is positive and significant for portfolios B big size, BH big size and high B/M and SH small size and high BTM value. It means HML does not explain S small size, SL small size and low BM and BL big size and low BM stocks returns. But, this factor cannot be ignored in making investment decisions as it is useful in other portfolios returns. It is observed that inclusion of two additional factors increases the Adj. R^2 of the model. Similarly, size premium has positive and significant impact in small portfolio returns. Size premium is observed insignificant for portfolios B big size, BL big size and low BTM ratio and BH big size and high BTM ratio. It means SMB is not significantly influencing the big equities return. Therefore, behaviour of size premium is not consistent but it has been priced in other portfolios and same is with value factor. Whereas market factor is found significant and positive related to returns of portfolios and this is consistent with conventional CAPM. Therefore, it is suggested that market factor can significantly explains equity returns but it is not capable to explain it fully.These results are consistent with the study of (Blitz, 2014). It must be noticed that incorporation of two additional agency based factors leads to significant increase in Adj. R^2 of the model.

Chapter 5

Conclusion and Recommendations

5.1 Conclusion

The aim of this study is to enhance knowledge of existing asset pricing literature by using empirical investigation. All the asset pricing theories state that investors cannot avail abnormal returns but can only get risk-adjusted returns. It means the higher risks are associated with high returns. However, after Roll's (1977) critique, different anomalies are identified in asset pricing models and investors can gain abnormal returns by using such anomalies.

This study identifies the cross-sectional variation in returns of Pakistan's stock market to the underlying behavior of size premium and value premium by using Fama and French 3-factor model but with two different approaches. One approach is the same as Fama and French used and the other approach is one which is proposed by Blitz (2014) in his study on asset pricing with respect to agency effect.

A sample of 84 companies for the period of 2002 to 2017 is used to examine the impact of various factors on equity return. The factor considered includes market premium, size premium and value premium. The descriptive statistics of premiums associated with these factors are calculated and are found positive. The

market premium is highest followed by size premium and then value premium. The correlation among the premium is also examined and no issue of multi co-linearity is observed.

The empirical results of this study show that the behavior of variables varies across different portfolios. Size premium is positively and significantly influence the return of market and all small size stocks while it is insignificant in all big size stocks. Similarly value premium is significantly positively influence the return of all big size stocks except with low BTM. It indicates that size factor only priced in portfolios containing small size stocks, whereas value factor is priced in stocks having high BTM while it is discounted in low BTM stocks.

Further this study focuses on the comparison between CAPM, Fama and French 3-factor model and Blitz (2014) agency based 3-factor model to analyze the difference in results of tested models. The results of CAPM are consistent with the theory but the explanatory power is low. Results of the three factor model are same as with previous studies carried out in Pakistan (Hassan & Javed, 2011 and Mirza & Shahid, 2008), whereas our newly tested agency-based 3 factor model is as good as in explaining the performance of portfolios sorted on size and value factors and also its explanatory power is found better than F&F 3 factor model and CAPM. Hence it can be said that influence of size and value premiums on equity return in Pakistan's equity market is observed. However, the results of value premium are not consistent and its behavior varies between small and large size stocks. Similar results are also reported by (Hassan & Javed, 2008; Hadi, 2017).

5.2 Recommendations and Policy Implications

It is recommended for investors to device investment strategies according to the size and value factors as both are found relevant, by using agency-based asset pricing model. Use of agency-based model is recommended for investment managers while making their strategies as it shows more explanatory power than F&F three factor model and performs substantially well in explaining equity returns.

The findings of this study not only contribute to the prevailing literature of asset pricing, but also have wider useful implications for both investment managers and investors as to understand the risk and return relationship is very important for rational decision making.

This study validates the previous findings that agency effects should be incorporated in investment decisions as inclusion of these effects improves the performance of asset pricing model.

5.3 Direction for Future Research

This study provides opportunity for future research in asset pricing domain. Existing studies on agency-based three factor model has conducted in developed countries. This study provides insight about the market, size and value premiums by incorporating the agency affects that arise due to delegated portfolio management, in emerging markets like Pakistan. Larger sample size and different time period can be used for future studies for confirmation of the findings of this study. The same agency based model might be tested in other emerging markets to validate the results.

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