DETERMINANTS OF SHARI'A COMPLIANT STOCK RETURNS: EVIDENCE FROM KARACHI STOCK EXCHANGE

(A doctoral Dissertation)

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Stock exchange

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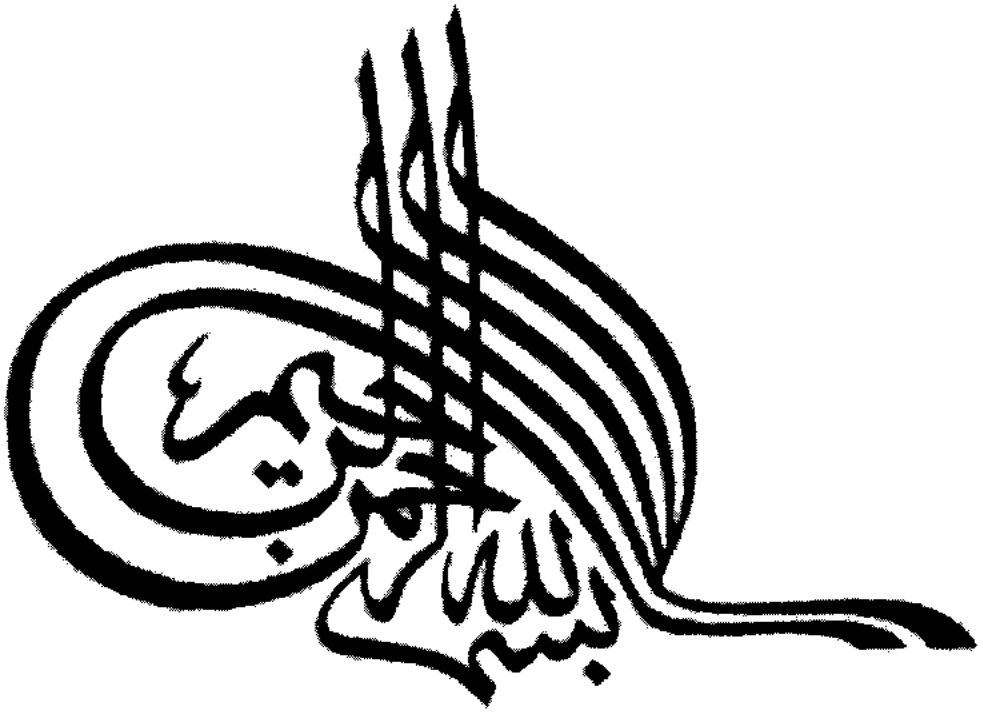
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The thesis titled "**Determinants of Shari'a Compliant Stock Returns: Evidence from Karachi Stock Exchange**" Submitted by **Muhammad Hanif** (12-FMS/PHD-FIN/F-09) in partial fulfilment of Doctor of Philosphy degree in Management Sciences with specialisation in Finance has been completed under my guidance and supervision. After receiving two reports from foreign evaluators, required changes have been incorporated. The suggessions advised by internal and external examiners have been incorporated. I am satisfied with the quality of student's research work and allow him to submit this thesis for further process as per IIU rules & regulations.

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DECLARATION

I hereby declare that this thesis, neither as a whole nor as a part thereof, has been copied out from any source. It is further declared that I have prepared this thesis entirely on the basis of my personal efforts made under the sincere guidenance of my supervisors. No portion of the work, presented in this thesis, has been submitted in support of any application for any degree or qualification of this or any other university or institute of learning.

Muhammad Hanif

PhD Scholar

Faculty of Management Sciences

To
Dr. Allama Muhammad Iqbal
Syed Abul Aala Modoodi
Dr. Tanzeel ur Rehman
Justice (R) Taqi Usmani
Dr. Atta ur Rehman
&
All helping hands especially my teachers, parents & family

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ACRONYMS

AAOIFI	Auditing & Accounting Organization of Islamic Financial Institutions
APT	Arbitrage Pricing Theory
B/M	Book to Market Ratio
CAPM	Capital Asset Pricing Model
CFY	Cash Flow Yield
DIY	Dividend Yield
EX	Export
FDI	Foreign Direct Investment
IDB	Islamic Development Bank
IFA	Islamic Fiqh Academy
IFSL	International Financial Services London
IP	Industrial Production
IR	Interest Rate
KSE	Karachi Stock Exchange
MOM	Momentum
MS	Money Supply
OIC	Organization of Islamic Conference
OLS	Ordinary Least Square
OP	Oil Price
PER	Price Earnings Ratio
PI	Price Index
RF	Risk Free Rate
RM	Return on Market Index
RR	Required Return
SBP	State Bank of Pakistan
SCS	Shari'a Compliant Security
SS	Shari'a Standard
WACC	Weighted Average Cost of Capital
WR	Workers' Remittance
XR	Exchange Rate

ABSTRACT

Islamic finance is an emerging area, with an impressive growth during first decade of twenty first century, with a global volume US$ 1,700 Billion of assets (WIBCR-2014) and presence in more than fifty countries of the world, by the end of 2013. As an expansion strategy, primarily dictated by liquidity requirements, Islamic finance has entered in capital market through Sukuk, equity investments and money market funds. This study is an attempt to understand the stock returns variation process of Shari'a compliant securities listed at Karachi Stock Exchange. Keeping in view the special nature of sample (Shari'a compliant securities) this study has tested the impact of both types of variables (macroeconomic and fundamentals) on stock returns and pricing of securities to develop a valuation model for Shari'a compliant equities. Macroeconomic variables identified for this study include exchange rate, inflation, interest rate, industrial production (proxy for GDP), foreign direct investment, remittances of expatriates, money supply, oil prices, gold prices and exports, while fundamental financial ratios include size, Price to Earnings Ratio (PER), Cash Flow Yield (CFY) and Book to Market (B/M) ratio. Also this research has used two market based factors i.e. Market index and Momentum. This study has used ten years market and accounting data for 100 Shari'a compliant companies. The analysis tools used are descriptive statistics, multi co-linearity, unit root testing by application of Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, trends in returns, co integration and regression analysis (Ordinary Least Square).

Results of the study provide evidence of a significant influence by the market index on stock returns of Shari'a compliant securities, with an explanatory power of about 70%. Capital Asset Pricing Model (CAPM) anomalies including size, B/M, CFY and PER also emerged in domestic market during the study period. Furthermore the size and price to earnings variables turned significant explanatory of variations in cross section stock returns of Shari'a compliant sample, during the period under review, on Karachi Stock Exchange (KSE). B/M and Momentum factors were not priced in the domestic market. Modified Fama & French model consisting of three variables including market index, size and price to earnings ratio captured variation in stock returns up to 76%. As for macro-economic variables are concerned, explanatory power was very high (96%) and four variables i.e. the exchange rate, market index, foreign direct investment and the interest rate were significant at 1% level. This study demonstrated that the KSE index captured the major stock variations in cross section stock returns followed by other micro as well as macro-economic variables; hence transparency through good governance at KSE is vital for economic progress.

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CHAPTER 1

INTRODUCTION

Valuation of assets is at the heart of finance since the early decades of the twentieth century. The importance of the topic is depicted through the number of models developed by researchers for asset pricing. One of the approaches to determine intrinsic value of an asset is the discounting of expected future benefits at the required rate of return, generally, known as fundamental valuation models (expected cash flows discounting models) and includes Dividend Discount Model (DDM), Operating Cash Flows Discount Model (OCFDM) Free Cash Flows to Firm Discount model (FCFFDM), Free Cash Flows to Equity Discount Model (FCFEDM) and Economic Value Added (EVA)[1]. The second approach is known as relative asset pricing models which includes Price to Earnings Ratio (PER), Price to Cash Flow Ratio (PCFR), Market to Book Ratio (MBR) and Price to Sales Ratios (PSR) (Reilly and Brown, 2003).

DDM (Williams 1938 & Gordon 1962) states that the value of a security is the present value of the expected dividends to investors, discounted at a risk adjusted rate of return. The focus of the model is upon cash distribution to the equity holders. Dividend discount model lacks two things in depiction of true value. First that dividend is not the

[1] Equally qualifies expected earnings to be used in a discounting model.

total income available to shareholders as a certain portion of earnings is retained by firms. Second, the dividend is based on accounting profit which is not truly representative of earning power due to number of reasons, including earnings manipulation by the management and cash collection risk (from accounts receivables).

FCFDM emerged in eighties. Jensen, (1986) defines free cash flow as the excess amount of cash after funding all projects with positive Net Present Value (NPV) discounted at relevant cost of capital. Underlying assumption is that any cash left over from operations and financing of fixed assets and working capital necessary to match the growth, belongs to capital providers. Free cash flow is a valuable tool to judge the management performance. It is less likely to be manipulated like accounting numbers. It is free from risk of default unlike accounting profits based on accruals. Free cash flow ensures the liquidity of the underlying firm and depicts the ability of the firm to service capital providers. Theoretically, valuation through free cash flow is much reliable than accounting profits. Limitation of the free cash flow model is that in certain years firms may go for massive capital expenditures hence understating the free cash flows. It is suggested that in the valuation process, average of three to five years may be used instead of relying on single latest figure generated by accounting reports. Further support from earnings is also required to distribute amount of cash to shareholders.

Fundamental valuation models have superiority on relative models as they take into account the fundamental performance of the underlying firm in the form of earnings, dividends, cash flows and economic value addition. It is general consensus that the intrinsic value of an asset is the present value of expected benefits to the investor. One of the important components of fundamental valuation models is the discount rate. Ideally, it

is the required rate of capital providers; hence, weighted average cost of capital is a good measure to use as discount rate in fundamental valuation models.

Weighted average cost of capital (WACC) is the weighted combination of required returns by capital providers generally in the form of any of the three (equity, debt and preferred stock) sources of capital. Following is the basic equation of WACC $WACC = W_eK_e + W_dK_d + W_pK_p$ Whereby, WACC is sum of weighted share of each source of financing. W is the weight, measured as contribution by each source of financing, and K is required rate of return, while e represents equity, d represents debt and p represents preferred stock. As for claim of preferred stock and debt holders is concerned, it is fixed and known in advance, while return to equity holders is not stated, hence, an analyst has to infer the required rate which assists in, at least, maintaining the current price of the security.

In order to determine required rate of equity number of models have been developed by researchers including opportunity cost, Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT)/ multifactor models. Concept of opportunity cost states that an investor should choose the best alternative among available options hence benefits attached with second best option becomes the required return for investor.

The CAPM, developed by W.F.Sharpe (1964) & J. Lintner (1965), states that expected return on an asset is the linear function of expected risk of the asset; and total risk of a security is distributed between systematic and unsystematic risk. Unsystematic risk can be reduced/ eliminated through efficient diversification while systematic risk is priced by the market. CAPM is most widely used and tested model due to its simplicity and easy application being relying on a single risk factor (i.e. Beta). However reliance of

CAPM on a single factor of risk (Beta) is its limitation. Beta, the measure of systematic risk, under CAPM framework is also behaving differently in longer and shorter period which makes finding skeptical (Hanif, 2010).

In order to remove this limitation of CAPM, Arbitrage Pricing Theory (APT) was proposed by Stephen Ross in 1976. Unlike CAPM, the theory of arbitrage pricing advocates that multiple factors contribute in the security risk (pricing), hence, in the process of calculation of required return one should not rely on a single risk factor. APT is much better theoretically being advocating more than single risk factor but lacks in identification and quantification of variables to be used in prediction of returns in its original form. Consequently, different variables are identified in different studies conducted in different institutional settings. Multifactor models of risk and return developed later on the foundations of APT. Multifactor used in valuation models by researchers to determine the impact on stock returns are classified by Reilly & Brown (2003) into macroeconomic variables (e.g. inflation, interest rate, exchange rate and money supply etc.) and micro or firm level factors (e.g. Size, B/M and P/E ratios).

An emerging area in finance is the Islamic finance whereby activities of financial market players are regulated by Shari'a (Islamic law). The major differences between conventional and Islamic finance include (1) prohibition of interest in business dealings (2) list of prohibited and permitted business activities (3) profit and loss sharing by financier (4) prohibition of Gharar (excessive risk) and (5) prohibition of Myser & Qimar (speculation). Islamic Financial Institutions (IFIs) operate worldwide with an asset base of about US$ 1,700 Billion by the end of 2013(WIBCR-2014). Islamic finance industry has shown tremendous growth in the first decade of 21st century. Global assets of Islamic

finance have been increased by 21% from 2007-13 and depicted growth of 38% and 25% in 2007 and 2008 respectively (IFSL-2013)[2], an era of economic downturn in developed world. Islamic finance has grown at a rate of 28% in Pakistan for the last six years [2008-13]. By the end of Sep 2013, number of IFIs operating in Pakistan is 19 (5+14) with branch network of 1,161, covering approximately 10% of the domestic market share (SBP-2013[2]).

Although IFIs (working in domestic market) have succeeded in getting the trust of the depositors and collect the deposits on profit and loss sharing basis, however, investment avenues for IFIs are limited in comparison with conventional banks due to Shari'a constraints. IFIs cannot invest in any interest based instrument of financing, hence, government securities, corporate bonds, interest based investment schemes of (financial sector including) leasing companies and investment banks are eliminated. Even for investment in equities, IFIs are not free to invest in any equity security, rather have to screen out the firms for investment through Shari'a compliance filters (KMI-2008).

Under Islamic financial system risk & return relationship is yet to be developed in statistical/mathematical models form, however, principle is well defined; whole philosophy of business/investment under Shari'a framework is based on the principle of bearing risk to earn profit. According to famous Hadith (saying of Holy Prophet PBUH) *"sale transaction of something which is not in your possession is not lawful, nor is the profit arising from something which does not involve liability"* (English translation by Khan, 1989). A well-defined and established principle of Islamic financing is that there is no risk free return opportunity. Profit on underlying project is linked with bearing the risk of loss; otherwise

[2] Growth calculated by author through equation $FV = PV(1+G)^n$

it is Riba (interest) which is forbidden in Shari'a. Prohibition of personal and corporate loans for interest by Islamic Financial institutions (IFIs) provides solid evidence of nonexistence of risk free return under Shari'a compliant financial system. Tools used in financing and investments of IFIs are based on either sharing of risk and return (Musharaka and Mudaraba) or bearing risks of ownership (Ijarah, Salam, Murabaha, Muajjal and Istisna'a). Risk bearing has a prime place under Shari'a compliant financial system. Rationality states that return on less risky projects should be lesser in comparison of high risk projects.

Capital market is one of the major sources of diverting funds from savers to investors. According to AAOIFI[3] Shari'a standard # 12, 17, 20 & 21 except few activities (including preference shares, tmattu' shares, purchase of shares through interest based loans, margin sale, short selling, lending of shares, application of Salam contract, futures, options, swapping, renting of shares and trading of interest based bonds) of capital market its operation is in line with Shari'a teachings. Islamic finance is expanding in capital market in the form of Islamic indexes, Sukuk, money market funds and equity market funds. According to ISI Emerging Markets[4], approximately 2000 issues of Sukuk were held with Global volume of around US $200 Billion by the end of June 2010. In addition to corporate Sukuk, Sovereign Sukuk are also issued by the governments including Pakistan, Jordan, UAE, Thailand, Malaysia, Turkey, Indonesia, Bahrain, Qatar, Cayman Islands, Singapore, Germany, Brunei, Gambia and Kuwait. One of the major challenges for Islamic financial industry is the liquidity management through investment

[3] AAOIFI is accounting and auditing organization of Islamic financial institutions, based in state of Bahrain, has issued accounting, auditing, corporate governance and Shari'a standards for guidance of Islamic finance industry.

[4] http//www.securities.com/ accessed on 5th July, 2010.

in marketable securities. Shari'a compliance of underlying security (equity, bond) is pre-requisite to qualify for investment by an Islamic bank/asset management company. Interest based securities (Government and private bonds) are straightaway prohibited investment avenues for Islamic banks. Investment in equities is allowed with certain restrictions to ensure the Shari'a compliance of investee. As a matter of fact only those companies qualify for investment by Islamic banks which display Shari'a compliant character in their operations as well as finances. Ideally two major features of Shari'a compliance including interest free finances and Halal business (dealing in goods and services permitted by Islam) are required in their entirety, however keeping in view the existing business environment, expectation of complete adherence to these features by an equity security may be inappropriate, hence Ulema (Clerics of Islam) have accepted a minor violation, although income generated through Haram sources must be utilized for charitable purposes. There are above ten Islamic Indexes operating worldwide (e.g. DJIM, FTSE, S&P, NASDAQ, MSCI, HSBC, Ameri, BID, Azzad and KMI). There exist differences in filtering criteria of these indexes and it is possible that a company is Shari'a compliant under one index and not under other(s)

This study is intended to understand and document the factors affecting pricing of Shari'a Compliant securities and explain variations in stock returns on Karachi Stock Exchange (KSE). To determine the required rate of return under conventional frame work, traditionally, either of the two types of variables (macroeconomic and fundamentals) is used to determine the impact on security pricing. Keeping in view the special nature of sample (Shari'a compliant securities) this study has tested the impact of both types of variables (macroeconomic and fundamentals) on stock returns and pricing

of securities to develop a valuation model for Shari'a compliant securities. Macroeconomic variables identified for this study include exchange rate, inflation, interest rate, industrial production (proxy for GDP), foreign direct investment, remittances of expatriates, money supply, oil prices, gold prices and exports, while fundamental financial ratios include size, price earnings (P/E) ratio, Cash flow yield (CFY) and book to market (M/B) ratio. Also we have used two market based factors including Market index and Momentum.

This study is different from earlier studies in several aspects. To the best of our knowledge this is the only study of its nature, in domestic market, which includes both types of pricing variables i.e. macroeconomic variables and fundamental financial factors. Earlier studies included either fundamental variables or macroeconomic variables to seek explanation of stock returns' variations. Furthermore this study is conducted with important fundamental variables including size, book to market, earnings and cash flows, not well researched in domestic market. Also this study has conducted with a reasonably large number of macroeconomic variables. Furthermore this is the only study of its nature which is to be conducted on a sample of Shari'a compliant securities in domestic market. Earlier studies conducted on KSE for valuation of securities have not differentiated between Shari'a compliant and conventional securities. Also we have included three additional important variables, not well researched in domestic market including gold prices, exports and workers' remittances. We focus on gold because recent movements in gold prices have created a parallel market for investors. Worker's remittances play very important role in domestic economy and forms about one third of foreign exchange earnings, hence we expect a role of remittances in stock price movements. Exports are a

source of revenue for firms, leading to profitability; hence a role is expected in returns' variations of cross section stocks. Another difference of this study is that we have applied comparatively Fama & French [FF] three factors' model and modified FF model to get fresh insight about impact of fundamental performance measures [including earnings, cash flows] and momentum on stock returns; and finally as per our knowledge this is the only study on CAPM anomalies in local setting.

Our contribution in the literature as follows. First we tested in parallel CAPM and SCAPM [risk free rate replaced with inflation] to document the evidence; second we document evidence on CAPM anomalies; third we used Regular Income Certificate (RIC) return as risk free rate proxy; fourth we used eleven macroeconomic variables in our study to document the influence on sample returns; fifth we used extended Fama and French model by inclusion of momentum, cash flows and price to earnings to document the impact on stock returns; and finally our sample is unique i.e Shari'a compliant companies at Karachi stock exchange.

1.1. Research Objectives

Research objectives of this study are to identify determinants of stock returns and include following:-

I. *To test the comparative application of Capital Asset Pricing Model (CAPM) and Shari'a Compliant Asset Pricing Model (SCAPM) and document evidence of influence of market index on cross section stock returns of Shari'a Compliant securities; and check robustness of CAPM anomalies.*

II. *To document the significance of relationship and Impact of macroeconomic variables including market index exchange rate, inflation, interest rate, industrial production/GDP, foreign direct investment, remittances of expatriates, money supply, oil prices, gold prices and exports on stock returns and Shari'a compliant security pricing in Pakistani market and to check the robustness of earlier studies.*

III. *To document the prediction power of Fama & French three factors model including market index, size and book to market in variation of stock returns of Shari'a compliant securities listed in domestic market and check robustness of results.*

IV. *To do a new experiment by modifying FF three factors model by inclusion of three additional variables of price to earnings ratio, cash flow yield and momentum effect as explanators of variations in cross section returns of Shari'a compliant securities in domestic market*

This study is useful in many aspects. First, this study has uncovered the impact of fundamental variables (including size, B/M CFY & PER) as well as large scale macroeconomic variables (eleven macroeconomic variables) in security pricing. Second this study is conducted on the sample of Shari'a compliant equities, consequently, it will assist Islamic financial industry in their investment decisions. Third this study is intended to uncover CAPM anomalies (if any) in domestic Market. Fourth this study could potentially provide a pricing model with maximum explanatory power of stock returns' variations in domestic market on Shari'a compliant sample.

In order to achieve the research objectives, this study has used monthly market and accounting data from January 2001 to December 2010 for 97 non-financial Shari'a

compliant companies as filtered by Al-Meezan Investment Management Limited (AIML) at closing of 2009. Market data is obtained from DataStream and only missing data (if any) is obtained from Karachi Stock Exchange website and Ksestocks.com. Accounting data is used from balance sheet analysis prepared by State Bank of Pakistan (SBP). Macroeconomic series data was obtained from statistical department of SBP. Analysis tools include exploratory analysis, regression analysis, unit root testing and cointegration. Two computing software, including MS Excel and E-views 8 were used to compile the results.

Results of the study provide evidence of significant impact on stock returns by market index with an explanatory power of about 70%. CAPM anomalies including size, B/M, CFY and PER were also emerged in domestic market during the study period. Furthermore size and price earnings variables turned significant explanatory of variations in cross section stock returns of Shari'a compliant sample, during period under review, on KSE. B/M and Momentum factors were not priced in the domestic market. Modified FF consisting of three variables including market, size and earnings captured variation in stock returns up to 76%. As for macroeconomic variables are concerned, explanatory power was very high (R square 96%) and four variables including market index, exchange rate, foreign direct investment and interest rate were significant at 1% level. Study got the evidence that KSE index capture the major portion of systematic risk of Shari'a compliant sample during period under review.

Rest of the study proceeds in following order. In Chapter (2) summary of literature review is presented, followed by brief introduction of Karachi Stock market (KSE) and Shari'a Compliant Securities in chapter (3). Chapter (4) includes research

methodology. Chapters (5, 6, & 7) present empirical results of CAPM, Multifactor model (macroeconomic) and microeconomic factors, respectively. Chapter (8) concludes the study.

CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

In this chapter selected literature review is presented. We have covered areas including modern portfolio theory, capital asset pricing model, arbitrage pricing theory/macroeconomic variables, Fama & French three factors model and extended Fama & French model with the inclusion of momentum factor. Literature also covers important studies on earnings, dividends and cash flows.

Valuation of assets is an important area in the literature of modern corporate finance. Value can be further elaborated under different concepts including book value (net worth), market value (prevailing in the market), price (a customer is willing to pay to acquire) and intrinsic value (as what is the real worth) of an asset, a group of assets, a firm or a portion of firm. This study focuses upon the intrinsic value of a risky security. The value of risky assets is determined through risk and return relationship i.e higher risk class assets should offer higher return, hence lesser in present value. In order to determine expected risk and return certain forecasts are to be made including expected return of a security, timing of realization of these returns, and expected variability of these returns (Harrington, 1987).

Theory of valuation suggests that the intrinsic value of a security is the present value of expected benefits (discounted at required rate of return). Following is the basic equation of valuation of assets. $V = \sum_{i=0}^{n} \frac{E(R)}{(1+d)}$ [2-1]. Whereby V is the intrinsic value of a security; i is number of periods to hold the security; $E(R)$ is expected return (both returns; in the form of dividend and capital gains); and d is discount rate (required rate of return based on risk). $E(R)$ is measured in the form of earnings, dividends, cash flows expected from investment. d is measured through either opportunity cost or weighted average cost of capital (WACC). The major fundamental models (taking into account expected benefits) include Dividend Discount Model (DDM), Free Cash Flows Discount Model (FCFDM), Adjusted Present Value (APV), Abnormal Earnings Discount model (AEDM) and Economic Value Added (EVA). Opportunity cost suggests that an investor chooses the best of available alternatives; hence, any return attached with second best alternative becomes the discount rate. Opportunity cost is a subjective measure[5] as compared to WACC which gives accurate discount rate because it is based on measureable (verifiable) mixture of alternative sources of financing. WACC suggests that required return on a project should be equal to the demands of capital suppliers including equity, debt and preferred stock. WACC advocates that an investment should generate return sufficient to compensate the claims of capital providers. Following is the basic equation of WACC: $WACC = W_e K_e + W_d K_d + W_p K_p$ [2-2]; Whereby W is the weight K is the cost of each source of financing; e is the equity; d is the debt and p is the preferred stock. Required return on two (debt and preferred stock) of the three

[5] Under perfect market model return is linearly related with risk, hence projects in same bracket of risk carries same return.

summarized sources of financing is disclosed upfront and straight forward. However required return on equity by shareholders is being inferred by an analyst. It is the rate which ensures at least maintenance of share price in the secondary market. Researchers have developed number of models to assist in inferring the required return by an analyst including actual cost of equity calculated by dividing the latest Earnings Per Share on Market Price Per Share (EPS/MPS). Several valuation models e.g. Modern Portfolio Theory (Markowiz 1952), Capital Asset Pricing Model (Sharpe 1964), Arbitrage Pricing Theory (Ross 1976), Multifactor model (Fama & French 1992), were developed to determine the value of a risky security. Basic assumption of these valuation models is that expected risk and return relationship should be analyzed in the context of portfolio (a combination) of assets.

Another approach to valuation is the relative valuation techniques including Price to Earnings Ratio (PER), Price to Cash Flow ratio (PCFR), Book to Market Ratio (BMR) and Price to Sales Ratios (PSR) (Reilly and Brown, 2003; page 388). In the following paragraphs literature review is presented.

2.2. Determination of Required Rate of Return

2.2.1. Modern Portfolio Theory

The land mark in the valuation of capital asset pricing was the development of Modern Portfolio Theory (MPT) by Markowitz (1952) that led to risk quantification. According to MPT, variability of expected returns (variance/standard deviation) is a good measure of risk. As per MPT expected returns (in %) of a risky security is the sum of expected

dividend plus (minus) any capital gain (loss) divided by purchase price. $R_t = (D_t + G_t)/P_{t-1}$ [2-3]; Where Rt is the expected return; Dt is expected dividend; Gt is capital gain/loss calculated as the difference in the price $(P_t - P_{t-1})$ occurred during holding period, and Pt is the price of asset. In order to reach the figure of expected returns usually probability of different outcomes is identified and average of all expected outcomes is calculated. Expected returns are rarely accurate and to determine variations from average, variance is used as a measure of risk. Variance is the expected deviation of returns from average (of expected returns). It is a squared deviation from mean. Equation four is used to calculate expected returns of an asset, while equation five is used to calculate variance of returns on an asset over time. $E(R_i) = \sum_{i=1}^{n} P_i R_i$ [2-4]; $\sigma^2 = \sum_{i=1}^{n} P_i[R_i - E(R_i)]^2$ [2-5]. MPT is also termed as Mean-Variance model because it takes into account expected returns and variations in returns over time. Modern portfolio theory asserts that investors are concerned about portfolio risk and return; assuming that rational investors do not put all eggs in one basket, rather go for diversification of investment. Hence relevant measures are portfolio risk and returns. In case of a portfolio, expected return is the weighted sum of returns from all assets held by an investor over time; however *variance of portfolio is not simply the weighted sum of individual variances of assets.* Ideally variance of a portfolio is less than those of individual stocks' weighted risk, because of co-movement of assets' returns in opposite direction. Whenever a combination of assets, having less than perfect positive correlation, is formed into a portfolio, risk reduces; and in an exceptional case if two assets having perfect negative correlation (-1) with equal variance (e.g. 20%) are grouped in a portfolio with equal amount of capital invested, portfolio risk could be minimized to zero. Equation

sixth is used to calculate expected returns on a portfolio, while seventh is used for calculation of portfolio risk. $E(R_p) = \sum_{i=1}^{n} W_i(R_i)$ [2-6]; $\sigma R_p = \sqrt{\sum_{i=1}^{n} w_i^2 \sigma_i^2 + \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j Cov_{ij}}$ [2-7].

In a portfolio context, grouping of assets is made on the basis of less than perfect positive and/or negative correlation among them. "How much risk of a portfolio can be reduced generally" is an interesting question for a finance student/ professional. Answer lies in tracing the nature of risk. Risk can be classified as firm specific and market specific. Variation of returns due to the nature of business and special circumstances of a firm (unsystematic risk) can be reduced/eliminated through efficient diversification by including firms with negative correlations. How much diversification (inclusion of number of securities) ensures elimination of diversifiable risk? Answer depends upon stocks selection. If one could select stocks with near perfect negative correlation, efficient diversification point reaches immediately, however it is difficult to find combinations of stocks with such a perfect negative correlation as normally most of stocks in the economy move together, hence a reasonable number of stocks must be grouped to ensure fruit for diversification. Harrington, (1987) states that the most dramatic reduction in non-market related risk can be achieved with about 14 stocks in the portfolio. The second portion of variations in returns is common to every firm (systematic risk) which cannot be eliminated through diversification, hence should be priced by the market. An investor willing to invest in a risky asset should be compensated by the market by providing superior return as a risk premium.

Markowitz, 1952 suggested the concept of an efficient portfolio as well; an unmatched combination of assets in risk and return. A combination of assets is said to be an efficient portfolio if and only if it possesses following features. (1) Returns of this combination of assets dominate over any other combination with same level of risk. (2) Risk of this combination of asset is lesser than any other combination with equal returns. Given these features of an efficient portfolio, investment managers are always trying to maximize returns and minimize risk to attain efficiency. To put the theory in practice an investor has to perform following functions. (1) Estimate the returns of various assets by assigning probabilities under alternative circumstances (2) Calculate variance (standard deviation) of returns for assets selected. (3) Calculate correlation (or covariance) among the assets; and (4) Select an efficient portfolio based on lesser positive and/or negative correlation among assets.

Performance of these functions requires certain decisions in addition to mathematical calculations. First is as how to predict future? What is the probability of a particular outcome? What are expected trends in the market, industry of the firm and of the firm itself? Answers to these questions are difficult if not impossible and much depends upon higher degree of true answers in order to remain in business. Second is calculation of correlations among various assets. For N assets number of correlations is N(N-1)/2, hence to calculate correlation among 10 assets we have 45 pairs, for 15 assets 105 and for 20 assets 190 pairs. If only 100 stocks are shortlisted on the basis of individual risk and returns to form a portfolio of five to ten stocks an investor has to calculate 4,950 coefficients of correlations.

2.2.2. Capital Asset Pricing Model

As a further development in portfolio theory, contributions of Treynor (1962), Sharpe (1963), Lintner (1965) and Mossin (1966) are miles stones and worth mentioning. The most exciting model came on surface based on MPT was Capital Asset Pricing Model (CAPM) by Nobel Laureate William F. Sharpe in 1964. CAPM suggested Beta (correlation of a security with market portfolio) as measure of relevant (systematic) risk as unsystematic risk can be eliminated/reduced through meaningful diversification. While Markowitz suggested standard deviation/variance as a measure of risk (total risk of a security, portfolio), CAPM accounts for only a single portion of risk (i.e. systematic risk). Following is the basic equation of CAPM. $R_j = R_f + B_j (R_m - R_f) + \varepsilon$ [2-8]; Where R_j return of security j, R_f is risk free rate, B_j is Beta of Security j and R_m is market return, ε is error term assuming zero mean. Beta is a covariance of security J with market divided by variance of market and calculated as under. $B_j = CoV (R_j R_m)/VaR (R_m)$ [2-9]; And also covariance of security j with the market is product of standard deviation of security j, standard deviation of market and correlation between returns of security j and returns of market. Following equation is also used in calculation of Covariance between a security and market. $CoV_{jm} = \rho_{jm}\sigma_j\sigma_m$ [2-10]. Basic design of CAPM was as predictive model, however in practice most of the time data is taken from history, assuming history is the best predictor of future. This concept itself is contradicting with efficient market theory. Efficient market theory suggests that one cannot predict the future based on historical data. However to put the theory of CAPM in practice we are unable to predict

all variables required to calculate required return on a security. A very brief insight about selection of required variables is presented here[6].

To start with, as for required return is concerned, Beta is the only measure of risk, upon which whole scheme of CAPM is based. Beta determines risk premium for underlying security as how much above the risk free rate a security should earn. To determine beta, we need returns of the security and of the market. Where to get expected returns of the security and market to calculate covariance between security returns and market returns, as well as expected variance of market return. Given the difficulty of prediction in returns, to generate expected time series (as one to five years daily/weekly/monthly returns are used to calculate Beta), past returns are used as proxy for future. Whether past is going to repeat in future? If not and we cannot say with certainty, then the stability of relationship between underlying security and market is questionable, hence any beta which is based on past returns' time series is itself doubtful (e.g see Abdymomunov & Morley, 2011; Adrian & Franzoni, 2008; Fernandez, ; Lawellen & Nagel, 2006 ; Hawawini, 1983; Agrrawal & Clark, 2007;). Harrington, (1987) has documented an interesting comparison between two periods (1974 to 79) and (1980 to 84) by calculating Beta with market portfolio using regression technique for AT&T. In first case alpha is 0.432 & beta 0.575 and R^2 0.463 with statistically significant t values, while in second case alpha is 0.81 & beta 0.18 and R^2 0.59 with about significant t [1.91] (pages 106-7). This clearly shows the instability of relationship

[6] Readers who are interested in detailed study of issues relating to CAPM variables are requested to consult "Moderen Portfolio Theory, Capital Asset Pricing Model & Arbitrage Pricing Theory" by Harrington D.R. (1987)

between market and underlying security, overtime. Furthermore choice of period for calculation of Beta also affects results. Hanif, (2010) documented this difference on beta due to change in length of period as well as change in observation frequency, e.g. based on one year length with monthly frequency beta was 0.72 and with weekly frequency it was 0.74; and based on four years length, with monthly frequency beta was 0.82 and with weekly frequency it was 0.36. As it is clear from the evidence that beta changes with the choice of length and choice of interval, hence every investor does not be looking for same risk premium, resulting in placing the security at a point other than security market line.

Selection of market proxy for beta calculation is the other major issue. Theoretically it is market portfolio of all risky assets, however organized data is available for equity markets only, hence in various studies market portfolio is used which is not true representative of all risky assets[7]. Furthermore selection of a market index as representative of whole stock market is itself questionable, as for calculation of index; it does not take into account all listed securities, with an absolute ignorance of non-listed public securities as well as private companies. Very interesting is availability of different indexes such as DJIA, S&P (USA), KSE-100, KSE-30 and KMI-30 (Pakistan), and you will get different results by using different index. Frankfurter, (1976) documented the results calculated based on DJIA, and S&P, which were different for different indices, hence the choice of market index also affect Beta, resulting in variation in value of underlying security. Also there are commercial services providing beta of different securities, having very sophisticated tools of analysis as well as rich expertise. Peterson

[7] In Pakistan about 600 to 700 companies are listed and KSE-100 includes only 100 companies. There are thousand private companies and small businesses, as well as public sector companies, which are not represented by KSE-100.

(1972), compared the published betas by commercially beta providing services including Levy, Value line, Merrill Lynch and Oliphant. These commercial beta providers are supposed to be more sophisticated in their field as compared to ordinary investor. Riskiness of security can be categorized objectively as either aggressive or defensive and third category is moving with the market. However difference between beta service providers, measured through correlation (ideally would have 1), was 0.48 (Oliphant & Levy) to 0.85 (Oliphant & Merrill Lynch). It means most nearest estimation was done by Oliphant & Merrill Lynch although not matching perfectly, however estimation of Beta by Levy was far away from others (0.56 with Merrill Lynch) and (0.61 with value line). Same was true for value line (0.61 with Levy), (0.77 with Merrill Lynch) and (0.74 with Oliphant). In the presence of such a polarization the basic assumption of CAPM of homogeneous expectations among investors is violated.

And the last variable in CAPM suggested model of security valuation is risk free rate. CAPM also assumes that a risk free rate exists for investors and risk premium should be provided for investing in risky assets. Apparently a very appealing concept, however, a true risk free rate does not exist due to the control of central banks. True risk free rate should have been determined by free demand and supply forces of capital which is interrupted by governments as well as central banks. Furthermore which rate should be used as risk free rate? Whether the rate on long-term or short term bonds? Whether from public sector or private sector? In most of the studies, treasury bills rates have been used as representative of risk free proxy. Ideally risk free rate should compose of time value of money and inflation charge. In some economies inflation crosses risk free rate. Fama, (1970) reported the difference of estimated intercepts and risk free rate for the period

1935-68 by dividing the whole duration in sub periods and variation documented was between -3.4% to 16.4%[8].

Under Islamic financial system concept of risk free rate does not exist, hence, application of CAPM in its original form is questionable. Traditional CAPM is developed in interest based environment which is absent in Shari'a based financial system. Under Shari'a (Islamic law) risk and return mechanism is bit different from conventional business environment, as no risk free investment opportunity exists (allowed), hence original equation of risk and return is not workable. While the component of RF is not present in Shari'a compliant financial environment so the original equation of required return after modification becomes as documented by Tomkins & Karim $[R_j = (R_m)B_j]$ [2-11]; Whereby required return of investor depends upon relationship of individual security with bench mark (e.g. stock market) measured through beta and there is no minimum compensation in the form of Risk free return. According to Ashker (1987) RF Should be replaced by Z which is equal to $[Zaka\ rate/1 - Zaka\ rate]$ which is 2.56% because in order to attract capital for investment it is minimum return an investor would expect (willing) for investment to cover Zaka, otherwise investor would prefer spending instead of investing. Hence equation of CAPM becomes as follows (adopted from Ashker, 1987) $[K_e = Z + (R_m - Z)\ B_j]$ [2-12]; Whereby required return of investor depends upon two components; return to cover Zaka and risk premium measured through beta of a security in relation to a bench mark (e.g. stock market). Sheikh (2010) proposed the linkage of debt servicing with nominal gross domestic product growth (NGDPg) and replacement of RF with Nominal Gross domestic product growth rate. Under his

[8] As quoted by Harrington, 1987, author could not get original source.

proposed model equation of CAPM turns into following shape $[R_j = NGDPg + (R_m - NGDPg)\, B_j]$ [2-13]; Whereby required return of investor depends upon two components; Nominal GDP growth rate and risk premium measured through beta of a security in relation to a bench mark (e.g. stock market). Hanif (2011), suggested that as nominal RF is composed of two things (1) is real risk free rate and (2) is inflation charge. Real RF represents time value of money. It is the rent for using money. Any investor who is willing to invest in a business, foremost priority is the capital maintenance and then profit. Without covering the reduction in capital due to inflation, through profit, one cannot maintain his capital under paper currency regime. Furthermore inflation hits all the investments irrespective of risk level and impact of inflation should not be linear with riskiness of a security. Equation [2-11] developed by Tomkins & Karim (1987) missing this fact and puts the inflation in linear relationship with riskiness of a security. Also model given by Ashker 1987, is although providing a reasonably good proxy to be used by an Islamic investor, however not fulfilling the investor's concerns in an inflation based economy (like domestic market), where sometimes inflation enters into double figures and minimum reward of 2.56% is insufficient to accommodate rising prices. In order to accommodate forgoing observations following equation of Shari'a compliant asset pricing model looks appropriate $[R_j = N + (R_m - N)B_j]$ [2-14]; Where by R_j is required return of a security; N is inflation charge; R_m average return on market portfolio and B_j is beta of security (relationship of returns between security and bench mark such as stock market). For inflation proxies of Consumer Price Index (CPI), wholesale price index (WPI), Basket of selected commodities or even basket of selected currencies can be used.

CAPM is the most widely tested and practically used model in prediction of stock returns and portfolio selection. In spite of the problems listed above, it is the most intuitive; easy to apply and theoretically appealing model. Harrington, (1987) documented that average R Square is 0.33 between returns for a single security and market, and for portfolios results are even better (page 94), which is sufficient to justify the use of CAPM as a valuation model. However some empirically raised questions demand answers; including liquidity, market value (size), Book to market, earnings, cash flow, inflation, calendar effect and basic macroeconomic variables. Whether these are represented by a market portfolio (e.g. an index of a stock market)? Further issues include impact of Taxes, transaction cost, single period versus multi-period horizons and non-homogeneous investment horizons of investors.

Empirical evidence on explanatory power of CAPM is mixed. Since the development of the CAPM, number of studies has been conducted for testing the validity of the model. [e.g. Lau & quay, 1974; Jagannathan & Wang, 1993; Bjorn and hordahl, 1998; Huang, 2000; Gomez and zapatro, 2003;, Fraser and Hamelink, 2004; Grigoris and Stavros, 2006; Hui and Christopher, 2008;]. In Pakistan at least four studies are known to this author (Iqbal & Brook, 2007; Javed, 2009; Hanif & Bhatti, 2010; and Hanif, 2010;) on Karachi stock market. To conclude, although, results are mix but favor inapplicability of CAPM in its original form and demands modification. CAPM relies on single measure of risk (Beta) and ignores the other factors contributing to the risk of a security. The basic risk return relationship is not rejected hence model retains its place in literature and can be a helping hand to investors with certain modifications especially the inclusion of more risk factors as suggested in APT/ multifactor models. Nevertheless we

will test comparatively CAPM and SCAPM, and its anomalies on Shari'a compliant sample on Karachi stock exchange to test the robustness of results, as evidence of market index influence on stock returns exists.

2.2.3. Arbitrage Pricing Theory- Multifactor Model

In order to answer some of the questions, rose above, Arbitrage theory (APT) was presented by Stephen Ross, (1976). The most questioned phenomenon of CAPM by academicians as well as practitioners was the reliance of CAPM on Beta (relationship with market) as the only source of risk. It was believed that variation in returns of a security or portfolio is not fully captured by market index; hence other factors should also be traced. In an attempt, researchers started adding more factors including P/E, Size, Book to market, liquidity, taxes etc; and found some or all significant in one or another study. Stability of factors remained inconclusive, as some of these factors found significant in one period, while others in second. Harrington (1987) concluded *"there is no reason why a model containing several factors that explain securities' returns in one period should be significant in another period"* (page 189). Here lies the problem with multifactor model as a predictor of stock returns. If factors identified through historical data are inconsistent for expected returns, they are useless.

The Arbitrage pricing Theory (APT), relates the expected return of an asset to the returns from the risk free asset and a series of other common factors contributing in variation of stock returns. Arbitrage pricing theory was developed by Ross in 1976. Unlike CAPM theory of arbitrage pricing advocates, that, different factors contribute to security risk hence during calculation of required return, one should not rely on a single

risk factor. Following is the basic equation of APT $[E(R_i) = \lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2} \ldots\ldots\ldots\ldots \lambda_k b_{ik}]$ [2-15]; In the equation, λ_0 represents the intercept/constant which is like risk free return in CAPM, while λ_1 to λ_k represents the risk premium of each factor and b_{i1} to b_{ik} represent sensitivity of the security with relevant risk factor. The original theory has neither specified identity nor number of risk factors to be included while determining required return. Identification of factors relevant to a security or portfolio had been left to the investors/investigators. Factors used in testing the multifactor models by researchers are grouped (by Reilly & Brown, 2003) as Macroeconomic based risk factors and microeconomic level factors.

Roll, and Ross, (1980) documented that as many as four factors are significant in explaining variation in stock returns during the study period of 1962-72. In another study Roll, and Ross, (1984) concluded that there are four macroeconomic variables important in determining stock returns including inflation, industrial production, risk premium of low and high grade bonds and term structure of interest rates. Extending the work of Roll and Ross, Bower, et. al; (1984) calculated comparative expected/required returns through CAPM and APT for electric and gas stocks and found difference. For electric companies CAPM required return was high (13.2%) while for Gas companies low (11.8%) as compared to APT where it was (10.9%) and (13.7%) respectively. Their conclusion was favoring use of APT given the increased explanatory power in variation of returns. Dhrymes, (1984) documented very interesting findings that the number of factors is increasing, with an increase in number of securities in the group under study, starting from merely two factors for 15 securities rose to 9 significant factors for a group of 90 securities. Macro-economic factors used by Chen, et. al., (1986) include market index,

industrial production index, inflation (total and unexpected), unanticipated change in credit spread and unanticipated term structure shift. Market index was still there as an important explanation of variations in stock return, which means some of the factors missing from identified factors and also justifying CAPM approach developed in 1960s.

Impact of macroeconomics variables on stock returns is well searched in various parts of the world and sufficient evidence exists globally (e.g. Chen, Roll & Ross, 1986; Mukharjee and Naka, 1995; Kwon & Shin, 1999; Kavussanos, Marcoulis & Arkoulis, 2002; Ibrahim & Aziz 2003; Adel, 2004; Chancharoenchai, Debooglu & Mathur, 2005; Al-Abadi, 2006; Patra & Poshakwale, 2006; Gan, Lee, Yong & Zhang, 2006; Chancharat, Valadkhani & Harvie, 2007; Coleman & Tettey, 2008; Rjoub, Tu¨rsoy, Gu¨nsel, 2009; Rao & Ramachandran, 2009; Srivastava, 2010), as well as in domestic market(e.g. Farid & Ashraf, 1995; Nishat & Shaheen, 2004; Kiani, 2006; Iqbal & Haider, 2005; Qayyum & Kemal, 2006; Rizwan & Khan, 2007; Hasan & Nasir, 2008; Hasan, Saleem & Abdullah, 2008; Mohammad, Hussain, Jalil & Ali, 2009, Hasan & Javed , 2009, 2009a; Butt & Rehman, 2010; Ahmed, et. al, 2010; Azam, 2011 and Akash, Hasan, Javed, Shah & Khan, 2011)

Chen, Roll & Ross, (1986) conducted study in the US market; covering period from 1953-83. Monthly data was used for macroeconomic variables including the term structure of interest rate, unanticipated inflation, risk premium, exchange rate, oil prices, real consumption and money supply. Results obtained by forming portfolios on size through cross-sectional regression show that four variables were significant as predictor of stock returns including industrial production index, risk premium, interest rate and inflation.

Chancharoenchai, Debooglu & Mathur, (2005) documented evidence for South East Asian economies including Thailand, Philippine, Indonesia, Malaysia, Korea and Taiwan. They focused on monthly returns from 1986-97 (pre-Asian crisis period). Variables studied include interest rate, inflation, real GDP, money supply and calendar effect (January effect). In order to get results, analysis was done through OLS and GARCH. For Thailand, they found evidence of the predictive power of the macroeconomic variables (especially money supply & real GDP) on excess returns and variances that changes overtime. For Philippine, treasury bills rate and January effect was found significant, for Indonesia, interest rate and January effect turned significant, for Malaysia, inflation, money supply and interest rate turned predictors of stock returns and for Korea, inflation and money supply appeared significant. Oyama, (1997) conducted study on Zimbabwe stock exchange and documented that relationship between stock returns and two macroeconomic variables including money supply and treasury bill rate has remained quite stable in post liberalization era (1991). These results confirm that there cannot be global variables as predictor of stock returns; hence players of every market had to identify local predictors. Further it seems quite unnecessary to presume that relationship remains stable over time. These are two real challenges to researchers and practitioners as for prediction of returns are concerned.

In Pakistani institutional frame work at least five recent studies are worth mentioning including Hasan, and Javed, (2009); Mohammad et al; (2009), Butt & Rehman, (2010), Haque et al; (2012) and Mohammad et al; (2012). The study of Hasan, and Javed, (2009), covers 10 years period (1998-2008) with seven macroeconomic variables including industrial production, oil prices, exchange rate, treasury bills rate,

inflation, money supply and foreign portfolio investment. Results provide evidence of the relationship between stock market returns and macro-economic variables. Mohammad et al; (2009) conducted study with six variables including foreign exchange reserves, exchange rate, inflation, capital formation, industrial production and money supply with quarterly data from 1986-2008. According to results three variables including money supply, exchange rate and foreign reserves are significant explanatory of stock returns. Butt, and Rehman, (2010) conducted study on the relationship of stock market returns and six macro-economic variables including inflation, risk free rate, industrial production, exchange rate, money supply and sectorial industrial production index. The difference between this study and study of Hasan, and Javed, (2009) was that later study was conducted on nine sectors including pharmaceuticals, petroleum, ghee and oil, automobile, cement, tobacco, fertilizer, textile and banking industry. Results are mix. In certain cases, relationship (between returns and macroeconomic variables) exists and in others not. Haque et al; (2012) conducted a study covering period 1998-2009 by using panel data of 394 listed companies on KSE by including GDP, inflation, interest rate, money supply, budget deficit, exchange rate and volatility in stock prices and concluded that returns of different sectors react differently to same macroeconomic variable. Finally a recent study of Mohammad et al (2012) was conducted with monthly data for a period of 24 years (1985-2008) by including eight macroeconomic variables including gold prices, gold reserves, oil prices, exchange rate, industrial production, money supply, money market rate and inflation. Results show gold and oil prices are positively affecting stocks, while industrial production, exchange rate, interest rate and money supply affecting negatively.

These studies conducted on KSE are missing few important macroeconomic variables including workers' remittances and exports; also only one study included gold prices, hence we lack evidence on these variables as explanatory of variation in stock returns. Further either these studies are conducted taking the returns of market index (KSE-100) or selected companies and no study has been conducted on Shari'a compliant universe. Additionally, study periods finish at 2008 except one which covers 2009 as well. Furthermore, Shari'a compliance filtration was started in 2008 and KMI-30 was introduced. No evidence about predictors of returns on Shari'a compliant stocks is available to date. This study was intended to test and document relevant macroeconomic variables for Shari'a compliant securities in order to assist Shari'a compliant investors including Islamic Banking sector. Reasonable number of companies forming part of KSE-100 index has been classified as Shari'a compliant companies, hence results could be generalized. Based on literature/evidence above it is concluded that macroeconomic factors have significant impact on variations in stock returns, however identification and quantity varies from sample to sample and period to period.

2.2.4. Microeconomic Factors

In search of predictors researchers focused on firm level variables in addition to market index. Basu (1977), Concluded on a sample of NYSE industrial firms that P/E ratio has relationship with performance of equity securities as low P/E portfolios earned superior returns during the study period consisting of 14 years (1956-71). Banz (1981) documented that firms with small market capitalization significantly outperformed firms with large market capitalization in return generating process. Chan, et. al. (1991),

conducted study in Japan's institutional setting and documented a significant cross-sectional relationship between the fundamental variables and expected returns in Japan. In their study during sample period B/M ratio shown tremendous performance in prediction of cross-sectional returns.

Hall mark in this effort was Fama & French three factors model (1992), which is not purely based on microeconomic factors, rather at best, it can be termed as a mixture of Macro and Micro factors, as it includes stock market index as well as firm level variables. i.e. is size (measured through market capitalization) and Book to market ratio of the company. They started by inclusion of P/E, Leverage, size, B/M and market index and finally concluded that three factors B/M, size and market index are important in explaining stock returns. Following is the FF three factors model. $R_p - R_f = a + b_m\,(R_m - R_f) + b_s\,SMB + b_h HML + \varepsilon$ [2-16]; In a follow up paper Davis, Fama, & French (2000), came up with very impressive results covering a very long period (1929-1997) for the US market. As per that study, all companies in the sample were divided into nine portfolios, sorted on size and BE/ME, value of R^2 was ranging between 0.93 to 0.98 with the minimum for B/H and maximum for S/H portfolios. Apparently it looks that predictors found, however, evidence from different stock markets of the world was must to support the model before it could be accepted as the main competitor of CAPM. Furthermore what about changing the data frequency, length of time etc. which might lead to different results? As for US market, Davis, et, al; (2000) divided sample into two periods. First period covered 34 years (July 1929-June 1963) and the results were not different from longer period study of 68 years. In fact R^2 for their sample ranging between 0.90 to 0.99, with minimum for S/L and maximum for B/L. Second sample

period covered 34 years (July 1963-June 1997) and again all R^2 were above 90%, ranging between 0.91 to 0.98, with minimum for B/M and maximum for S/M, S/H and B/L portfolios. It shows very clearly that as for US market is concerned (except hold out sample), for long term prediction, Fama & French (1992), three factors model is appropriate. In another study conducted by Barber & Lyon (1997), on hold out sample of financial firms, for US market, documented that as for relationship between stock returns and size, B/M ratio is concerned, it is similar for financial as well as non-financial firms. However results of a study conducted by Knez, and Ready, (1997) provide evidence against the size factor. This study was conducted on same data (used by FF 1992), however extreme observations were trimmed up to 5%.

Internationally, results of using FF three factors model are mixed. Rogers, and Securato, (2007) conducted a study on the largest South American market (Brazil) covering 6 years (07/1995 to 06/2001). As per their findings, HML (book to market ratio) did not turn significant as a predictor of stock returns. Ammann, and Steiner, (2008) conducted study on Swiss market covering 16 years (1990-2005) following modified Fama & French with the inclusion of momentum factor and documented that size, value and momentum do help explaining stock return variations. Homsud, et. al; (2009) documented results of Fama & French three factors model on Thailand Stock exchange covering 59 months (07/2002 to 05/2007) period. They find that in case of four out of six portfolios (sorted on size and book to market ratio) FF three factor model turned out superior than CAPM.

Iqbal and Brooks (2007a) found Size and Book to Market significant, in daily returns only, on Karachi stock exchange during 1999-2005. Liew, and Vassalou, (2000)

documented role of size and book to market in predicting future economic growth in ten countries from 1978-96, based on monthly observations and found significant in certain countries. Mukarjee, et. al; (1997) documented impact of fundamentals and stock returns and found B/M and size variable significant in addition to debt equity and sales/price.

Market to book ratio is also used in prediction of returns and play significant role in security pricing process. Capaul, Rowley, and Sharpe, (1993) documented evidence on growth stocks for six countries including France, Germany, United Kingdom, Switzerland, Japan and United States for 12 years (01/81 to 06/92) with a conclusion of existence of significant growth factor. Senthilkumar, (2009) documented Indian evidence with a sample of selected firms (over IRS; 500 crore sales) with a conclusion of no size effect while market-to-book significant. According to Fernandez (2002), Market to book (M/B) is closely related with price to earnings ratio (PER) and return on equity (ROE). The basic equation showing the impact follows. [M/B = Market Value/Book Value = Market Value/Net income * Net income/Book Value = PER * ROE]. Company's M/B ratio depends on the ROE, Ke and growth. Generally M/B and ROE has positive relationship, Ke and M/B has negative relationship and growth and M/B has positive relationship.(Fernandez 2002).

B/M ratio has also been turned significant as predictor of stock returns. Fama, and French, (1992) documented that companies with higher B/M ratio provided higher return to shareholders than companies with lower B/M ratio during the study period. Kothari, and Shanken, (1997) concluded that B/M ratio track time series variation in expected real return over the period under review. One standard deviation change in B/M results 20%

variation in expected returns. Lewellen (2002), found evidence of return prediction by B/M ratio, although lesser than dividend yield.

What is theory behind these predictors? A major criticism on FF model is the theoretical justification for using size and B/M factors. Bodie, Kane & Marcus (2011) suggest *"one possibility is that Size and relative value (as measured by the B/M ratio) proxy for risks not fully captured by the CAPM Beta..... Another explanation attributes these premiums to some sort of investor irrationality or behavioral biases"* Page (448). Liew and Vassalou (2000), documented that returns on HML and SMB portfolios are positively related to future growth in the macro economy, hence these may proxy for business cycle risk. Zhang (2005) stated that risk premium for value firms (high B/M) is justified due to irreversible investment. In severe recession, value firms will suffer from excess capacity which is not the case with growth stocks. Another explanation is the irrationality of market, valuing the glamour stocks high and when the actual performance is disclosed, market players disappointed (Porta, et. al; 1997).

It seems that FF model found variables first and justification later. As a matter of principle, the stock market movements should base on the performance of the firms, while size and book to market ratio are not traditionally accepted performance indicators. Performance measure is expected cash flows, measured through dividend, free cash flows and/or earnings (if any of them is not significant explanatory performance indicator, either investors are irrational or we should look for a new performance indicator). Ideally any capital gain on security prices should be backed by fundamental performance indicators. In fact when we accept the past behavior of investors, measured through returns calculated on price movements, as bench mark, the problem comes to fore. Whole

effort for justification and acceptability of any prediction model has been circling around this, however, the investors behavior in pricing securities has been proven wrong many times in the course of history (e,g. Black Monday at NYSE, 2007 crisis at KSE), then why do the asset pricing models should be justified and accepted based on investors behavior? Perhaps it is the appropriate time to leave investor behavior aside and look out of the box and come up with a theory as to what should be the pricing mechanism, instead of looking at what it is (was). Academic researchers' role should be leading instead of following.

Very important fundamental performance measure is earnings, as disclosed by accounting statement of income. Even value of a firm can be calculated through earnings multiple. According to this method value of equity is obtained by multiplying the annual net income by a ratio called Price Earnings Ratio (PER). PER or earnings multiple is calculated as follow. [PER = Market Price per share/Earnings per share]. Fernandez, (2002) identified the following factors affecting PER. First; Return on equity has positive relationship with PER. Second; growth in profits after tax having positive effect on PER. Growth is achieved through lesser dividend payout ratio and higher earnings retention ratio. Third is the required return on equity which has negative relationship with PER and required return on equity is affected by interest rate and risk.

Campbell, and Shiller, (2001, 1998) conducted study on dividend to price ratio and price to earnings ratio on a larger period of 129 years (1872-2000), in USA institutional settings, and concluded that conventional valuation ratios (dividend to price and price to earnings) have a special significance to forecast stock prices. Penman, (1998) argues that valuation should be done by averaging the earnings multiple with book to

market ratio instead of using alone any of them in valuation process. The reason behind it, he states, is different value of firm is generated by different models and to reach at intrinsic value both models should be used in average. Liu, (2002) concluded with a sample of ten countries that earnings multiple valuation is the best while sale multiple is the worst in valuation of international equities. Dividend multiples and cash flows multiples performed better than sales multiple, however, lesser accurate in comparison of earnings. Lewellen (2002), found evidence of return prediction by earnings to price (E/P), although lesser than dividend yield, with a larger time period covering 55 years (1946-2000). Evidence suggests that P/E ratio has significant role in prediction of stock returns.

Dividend is also a well-recognized measure of performance. It is the distribution of profit by firms to shareholders, however growing firms, having projects with positive NPV, re-invest instead of paying dividends. Evidence on explanatory power of dividend is well documented in the literature. Kothari, and Shanken, (1997) documented with a larger sample covering 51 years period (1941-91) that dividend yield tracks time series variation in the expected real returns over the period under review. Lewellen, (2002) found strong evidence of return prediction by dividend yield with a larger time period covering 55 years (1946-2000). Baur, et. al; (1996) concluded that changes in market prices are associated with changes in traditional fundamentals as against commonly held proposition of investors' sentiments, in an investigative study post 1987, US market crash. Chan, et. al; (1991) documented that in Japan's institutional setting, significant cross-sectional relationship between the fundamental variables and expected returns found. Dividend yield used in isolation as well as with size, shown significant and positive impact on returns. Strong evidence exists about dividend as predictor of returns.

Another performance measure is free cash flows. Free cash flows model emerged in eighties (Jensen 1986), (Mann et. al. 1991), (Wang et. al. 2008), (Francis et. al. 2000). Jensen (1986) defines free cash flow as the excess amount of cash, after funding all projects with positive NPV, discounted at relevant cost of capital. Stowe et. al. (2002) states free cash flow to the firm is the amount of cash left over after meeting the operations and necessary investment in fixed assets and working capital to match the growth requirements. Under lying assumption is that any cash left over from operations and financing of fixed assets and working capital necessary to match the growth, belongs to capital providers. When adjustments are made for liabilities/external stake holders, then left over cash belongs to equity holders. Free cash flows are valuable tool to judge the management performance. These cannot be manipulated like accounting numbers. Unlike accounting profits based on accruals, these are free from risk of default. Free cash flows ensure the liquidity of underlying firm and depict the ability of the firm to service capital providers.

Free cash flow is frequently used by analysts to determine security prices. *"The ratio of share price to free cash flow per share ranks among the most effective stock-picking metrics since 1990, and the trend in free cash flow is among our favorite indicators of company operating momentum"* (Dow Theory Forecasts, July 24, 2006). Empirical studies have proven the performance of free cash flow discounting model reliable (e.g. Kaplan, and Ruback, (1995); Chan, et. al; (1991) and Brown; (1996). Arzak, (1996) concluded that FCF method should be avoided while valuing levered firm as it can lead to significant error. Apart from valuation, free cash flows are also helpful in

portfolio construction (e.g. Hackel, et. al; 1994, and JokipII, et.al. 2006). Evidence favors the use of free cash flows as predictor of stock returns.

A fourth factor 'momentum' (Jagadeesh, and Titman, 1993; Carhart, 1997) measured as Winners Minus Losers (WML) in the past, was also added to FF three factors model, hence it became four factors model. Momentum is defined as following the rallies of price movements and interest of investors to hold stocks provided superior returns in the past. Stocks with superior returns in preceding period termed as winners and stocks with less than average returns are known as losers. Following is the modified FF equation.$R_p - R_f = a + b\,(R_m - R_f) + b_s\,SMB + b_h HML + b_m\,MOM + \varepsilon$ [2-17]; According to Carhart, (1997) momentum is a significant variable and winners of last year performed well in following year but not in subsequent years. His results were based on a study, conducted by using mutual fund sample (1,892 funds) covering a longer period of 32 years (01/1962 to 12/1993) in the USA market. Ammann, and Steiner, (2008) conducted a study by following modified Fama & French model with inclusion of momentum and documented that size, value and momentum are explaining stock return variations in Swiss market during period under review. Demir, (2004) documented impact of momentum, size and liquidity and concluded that momentum is the most significant on Australian stock exchange during 1990 to 2001. Artmann et. al; (2012) conducted a study on a large sample of German stock market covering period 1963-2006 and documented superiority of Carhart four factors model over Fama & French three factors and also earnings to price four factor by excluding size performed slightly better.

In domestic context a study on fundamentals conducted by Irfan & Nishat (2002) is worth mentioning. Their study covers 20 years period with annual data of all consistently listed companies and used dividend yield, earnings volatility, payout ratio, size leverage and growth in assets as explanatories of return volatility. Result was different in pre and post reform (1991) era. Earlier fundamentals have more role than later period. Four factors including payout ratio, size, leverage and dividend yields found significant.

Two different in nature studies including Ferson et al; (1998) and Salaber (2007) are selected in this literature on account of exclusiveness. Ferson, et al; (1998) conducted study on 21 countries by including fundamentals and macroeconomic variables and documented that the role of price to book value ratio is strongly related to global stock market risk exposure. While Salaber (2007) selected sin stock returns of 18 European countries for a period of 1975-2006 and documented that returns depends upon legal and cultural characteristics including religion, taxation and degree of litigation risk.

To conclude, evidence exists about application of CAPM, along with its anomalies, but still it has a prime place in asset pricing process. Under multifactor approach some of macroeconomic variables turned significant, however these are country specific and not unanimous for every economy. Mixture of firm level variables and market based factors, as used by Fama & French (1993, 2000) turned out more appropriate and feasible with higher explanatory power. Further studies included more variables in FF model (e.g. momentum, liquidity, industry index etc) and still doors are open to search and include more variables either firm level or market based. It makes sense to apply CAPM, macroeconomic factors model, FF three factors model and modified FF model (with inclusion of fundamental performance measures) on Shari'a

compliant sample to document evidence on robustness of results or otherwise. It is expected that outcome of research would be an applicable asset pricing model for Shari'a compliant securities on KSE.

There exists gap in literature as for CAPM anomalies and Shari'a compliant securities' stock returns explanatories are concerned in domestic/local market; hence we have planned this study to identify the important fundamental and macroeconomic factors which affect pricing mechanism of securities in domestic market. We have documented/tested impact of market based factors including market index and momentum; fundamentals including size, book to market, earnings and cash flows; and macroeconomic factors including inflation, oil prices, gold prices, foreign direct investment, exports, industrial production, interest rate, money supply, workers' remittances and exchange rate.

2.3. Hypothesis

Based on literature cited above following hypothesis are proposed for testing.

H_1: Market index has significant impact on the variation of stock returns for Shari'a Compliant securities.

Sub Hypothesis:

1. Proxy of inflation used in SCAPM is better explanatory of intercept than risk free rate used in CAPM.
2. CAPM anomalies including size, book to market, cash flows and earnings are present in domestic market.

H_2: Macro economic variables play important role in security pricing and have significant impact on stock returns of Shari'a compliant securities.

H_3: Fama-French three factors model is superior to CAPM as for cross section return variation is concerned and has more explanatory power.

H_4: Modified Fama-French model (by inclusion of PER, CFY and Momentum) is superior to CAPM as well as FF three factors.

CHAPTER 3

INSTITUIONAL SETTINGS

In this chapter a brief is provided about domestic stock market, institutional framework and Shari'a screening criteria of equities as adopted by KSE-Meezan Index (KMI-30). Also an update on Islamic finance is provided covering global volume, regional shares, domestic market, Sukuk and Shari'a guidelines about capital market.

3.1. Karachi Stock Exchange

Stock market in Pakistan consists of three stock exchanges i.e Karachi Stock Exchange (KSE-100), Lahore Stock Exchange (LSE-30) and Islamabad Stock Exchange (ISE-10). KSE was established in 1947. LSE was established under the Companies Act 1913 on 5th October 1970 and started working by December 1970[9]. The Islamabad Stock Exchange (ISE) was incorporated as a limited Company on 25th October, 1989 in Islamabad Capital territory of Pakistan[10]. The capital market is regulated by Securities and Exchange Commission of Pakistan (SECP) established in 1997 (earlier was known as Corporate Law Authority established in 1947). KSE is the main national market. Although the decade of 60's is known for industrialization in Pakistan and the number of

[9] http://lse.com.pk/#/LSE/History.aspx accessed on 28/05/2014
[10] http://ise.com.pk/ accessed on 28/05/2014

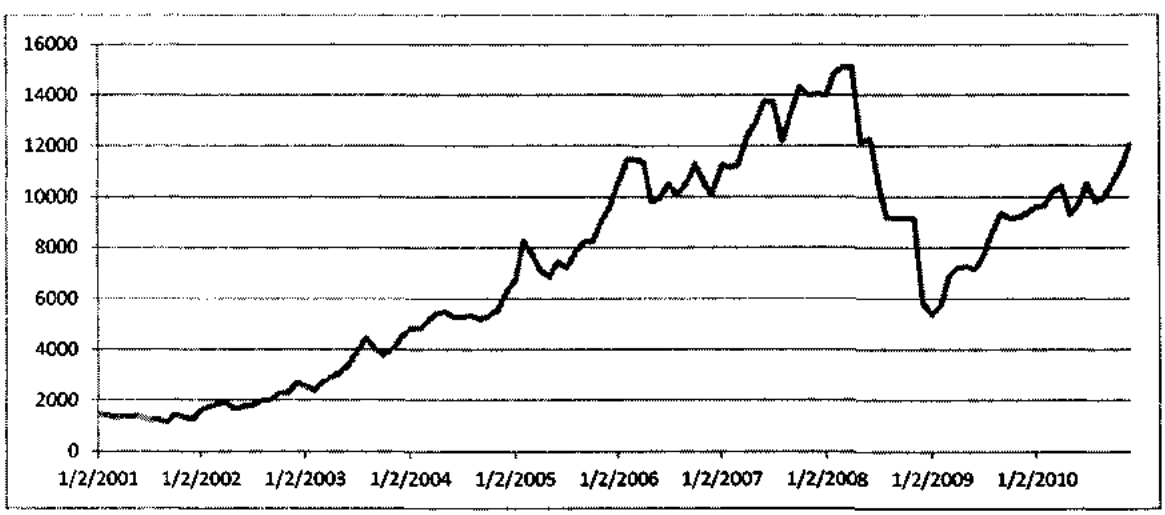
total companies rose to 318 in 1971 (Qayyum & Kemal, 2006), however, momentum could not last for a longer period and in 1970s government started and completed mass nationalization. Nationalization policy reversed in late 1980s and massive privatization started. In early 1990s, reforms took place in the capital market, whereby market opened for international investors; repatriation of investment proceeds was allowed; economy was deregulated; establishment of commercial banks in private sector was allowed; foreign exchange market liberalized and opening and maintenance of foreign currency accounts was allowed. As a result of these measures stock market showed tremendous progress and the number of companies listed on KSE rose to 542 and the market was ranked third after Argentina and Columbia in 1991 (Qayyum & Kemal 2006). In the first decade of 21st century, KSE displayed tremendous performance and declared the best performing stock exchange in 2002 by international magazine "Business week"[11]. After liberalization and reforms, KSE-100 index showed tremendous upward movement from 1,989 in 7/1997 to 15,125 in 3/2008. Figure 3-1 shows trends in KSE Index during study period (2001-10). As at January 1st 2001, index value was 1,462, which reached at highest point of 15,125 on March 3rd 2008 and declined to 7,202 on April 1st 2009, and reached 12,359 on January 3rd 2011, displaying an average annual growth of about 33%.

Research on KSE covers many areas including testing of CAPM (Iqbal & Brooks, 2007; Javed, 2009; Hanif & Bhatti, 2010; and Hanif, 2010;), Multifactor's model (Attaullah, 2001; Iqbal & Haider, 2005; Hasan & Javed, 2009, 2009a; Mohammad, 2009; Butt & Rehman, 2010; Qayyum, & Kemal, 2006; Iqbal & Brooks, 2007a), market efficiency (Farid & Ashraf, 1995; Javed & Ahmed, 1999; Mustafa, 2008; Hameed &

[11] http://lse.com.pk/#/LSE/History.aspx accessed on 28/05/2014

Ashraf, 2006; Mahmood, 2007; Majid, 2007; Ali & Akbar, 2009; Zafar, Shah & Urooj, 2009; Mustafa & Nishat, 2007; Bashir, Ilyas and Furrukh, 2011; Nisar & Hanif, 2012), capital structure (Shah & Hijazi, 2004; Shah & Khan 2007, Shah, 2007; Ahmad & Hanif, 2012; Hussain, Farooq & Khan, 2012), co integration analysis (Hasan, Saleem & Abdullah, 2008) and corporate governance (Hasan & Butt, 2009; Shah, Butt & Hasan, 2009;). To the best of our knowledge, any study on the valuation of assets through combination of fundamental financial factors/microeconomic variables and macroeconomic variables on Shari'a compliant sample has not been done so far on KSE.

Figure 3-1 Trends in KSE-100 Index [2001-10]



3.2. Shari'a Compliant Securities

Islamic banking and finance industry is expanding world over with an unprecedented growth. The global volume of Shari'a compliant assets has reached to US $ 1,700 Billion by the end of 2013, displaying a growth of 21% from 2007-13 (GIBCR-2014) Middle East and North Africa (MENA) region is the centre of Islamic finance market and contributes 74% share in global assets under Islamic finance, followed by East Asian

region with a share of 17% while 9% from rest of the world. (IFSL, 2013). Share of Bank assets is 90% followed by equity funds 5% and rests are others in the global volume of assets under Islamic finance.

In Pakistan Islamic financial services are expanding nationwide; and by the end of September 2013, number of Islamic Banking Institutions (IBIs) has reached to 19[12] with the branch network of 1,161. Total assets of Islamic banking industry are Rs; 926 billion (US $ 9.26 billion approximately) covering almost 10% of domestic market share. Islamic finance has grown at 28% per annum for 2008-13 (SBP-2013). For Islamic financial industry, deposit collection is not as much difficult as is financing and investments in business and industry. The investment avenues are limited due to Shari'a compliance restrictions as compared to conventional banks. For IFIs, Shari'a compliant modes of investments are a must. Conventional interest based bonds, leasing and insurance companies' certificates and government securities are not in line with Islamic financial system. However investment in equities, which are primarily profit and loss sharing based, fall within Shari'a compliant investment universe.

Capital market is one of the major sources of diverting funds from savers to investors. According to Shari'a standard # 12, 17, 20 & 21 except few activities of capital market (including preference shares, tmattu' shares, purchase of shares through interest based loans, margin sale, short selling, lending of shares, application of Salam contract, futures, options, swapping, renting of shares and trading of interest based bonds), its operations are in line with Shari'a teachings. Islamic finance is expanding in capital

[12] Five are fully fledged Islamic banks and fourteen are conventional banks with independent Islamic banking divisions.

market in the form of Islamic indexes, Sukuk, money market funds and equity market funds. According to ISI Emerging Markets[13], approximately 2000 issues of Sukuk were held with Global volume of around US $200 Billion by the end of June 2010, however pace of Sukuk issuing was increased during 2011-12 and upto June 2013, volume of Sukuk issued in two and half years was US $281 Billion [IFSL-2013]. In addition to corporate Sukuk, Sovereign Sukuk are also issued by the governments including Pakistan, Jordan, UAE, Thailand, Malaysia, Turkey, Indonesia, Bahrain, Qatar, Cayman Islands, Singapore, Germany, Brunei, Gambia and Kuwait.

To address the issue of investment in marketable equities (which are primarily based on profit and loss sharing principle), Shari'a screening filters have been developed and we have above ten Islamic Indexes operating worldwide including DJIM, FTSE, S&P, MSCI, HSBC, Ameri, BID, Azzad and KMI. There exist differences in filtering criteria of these indexes and it is quite possible that a company is Shari'a compliant under one index and not under other(s) [see Derigs & Marzban, 2008]. This difference exists among all followers of revealed books (Jews, Christians and Muslims), in explanation and detailed rules development based on revelations. There are at least five schools of thoughts based on solid reasons and logic among Muslims including Hanfi, Shafai, Malki, Hanbali and Jaafari.

In Pakistan Al-Meezan Investment Management Ltd (AIML), subsidiary of a leading IFI (Meezan Bank) took the initiative and started screening of KSE listed securities through Shari'a compliance filters and developed KSE-Meezan Index (KMI-30). Test of Shari'a compliance of stocks is done under the guidance of qualified and

[13] http//www.securities.com/ accessed on 5th July, 2010.

reputed Shari'a experts. For a security, to be "Shari'a compliant" based on KMI Criteria, it must meet ALL the six key tests given below (KMI-2008).

1. Halal Business of the Investee Company: Core business of the company must be HALAL and in-line with the dictates of Shari'a. Hence, investment in securities of any company whose principal activity consists of a Haram (unlawful) business, e.g. dealing in conventional banking, conventional insurance, alcoholic drinks, tobacco, pork production, arms manufacturing, pornography or related un-Islamic activities, is not permissible.

2. Interest Based Financing: Interest based debts to assets ratio should be less than 40%. Debt, in this case, is classified as any interest bearing debts. Zero coupon bonds and preference shares are, both, by definition, part of debt[14].

3. Shari'a Non-compliant Investments: The ratio of non-compliant investments to total assets should be less than 33%. Investment in any non-compliant security shall be included for the calculation of this ratio.

4. Purification of Shari'a Non-complaint Income: The ratio of Shari'a non-compliant income to total revenue should be less than 5%. Total revenue includes Gross revenue plus any other income earned by the company. This amount is to be cleansed out as charity on a pro rata ratio of dividends issued by the company.

5. Net Liquid Assets to Share Price: The market price per share should be greater than the net liquid assets per share calculated as: (Total Assets – Illiquid Assets – Total Liabilities) divided by number of shares. A liquid asset mean the asset which cannot be

[14] As per Shari'a Standard # 21, amount of interest based loans should not be more than 30% of market capitalization of the Company.

traded except at par value as per Shari'a rulings and includes cash, bills receivables, promissory notes, accounts receivables, bonds, preferred shares etc.

6. Illiquid Assets to Total Assets: The ratio of illiquid assets to total assets should be at least 20%. Illiquid assets, here, is defined as any asset that Shari'a permits to be traded at value other than the par and includes physical assets (land, building, furniture, machinery, computer, office equipment etc) inventory (raw materials, work in process and finished goods), equity investments (ordinary shares, PTCs, TFCs and Sukuk etc), intangibles (goodwill, patents and copy rights etc).

In order to understand the impact of these tests let us look at the available equity securities in the capital market. All securities of financial sector including conventional banking, insurance companies, specialized financial institutions, leasing companies etc. and securities of all companies engaged in Haram businesses e.g. liquor, pornography, pork, speculation, hoarding, tobacco, casinos, night clubs, adultery etc. are excluded from Shari'a compliant investment universe through *Halal Business* test one.

We left with Halal businesses of real sectors including manufacturing, trade and services sectors, however, a large number of companies may not be able to qualify the *Halal Financing* test, restricting interest based debts to total assets ratio less than 40%. Practically many large firms employ a huge amount of debts to meet the expansion, growth and asset replacement requirements. One of the strongest motivations to employ interest based debt financing by firms is the tax incentive. It is very interesting to note that as per accounting practices and national taxation laws (almost in every country) interest charge on debts is treated as pretax cost and deducted from revenue to calculate income tax. It means regulator himself is promoter of interest based financing in business

world. Had we not have this incentive of interest based debt financing, firms would lose the tax benefit and motivation to employ debt financing. With the application of second test IFIs lost another reasonable number of financially sound and profit generating firms.

Halal investment & Revenue tests deal with a portion of investment and revenue generated through Haram sources. Ideally answer of these tests should be zero, however, except a small number of firms, results are always positive and it is really difficult for firms to avoid Shari'a non-compliant investments and revenue till the maturity of Islamic financial system.[15] Tests five and six are about the mixture of liquid and illiquid assets and market to book ratio of net liquid assets. Meeting of these criteria is not a very difficult task for a large number of firms as almost every firm in business of manufacture, trade and service can easily qualify both tests of having illiquid assets more than 20% and price to book ratio of net liquid assets more than one.

AIML and KSE with mutual collaboration launched KSE Meezan Index (KMI-30) in 2008, which serves as a bench mark for Shari'a compliant investment portfolios. Index is updated and recomposed in May and November of every year on the basis of December and June positions of companies, respectively. With the introduction of screening of Shari'a compliance of securities listed on KSE, investment opportunities for Islamic financial industry have increased and one can expect increase in investments and liquidity of IFIs in domestic market.

[15] [e.g. reach of Islamic banking in Pakistan is limited in the economy with branch network of 1,161, covering around 10% of market share by the end of September 2013 (SBP-2013).

CHAPTER 4

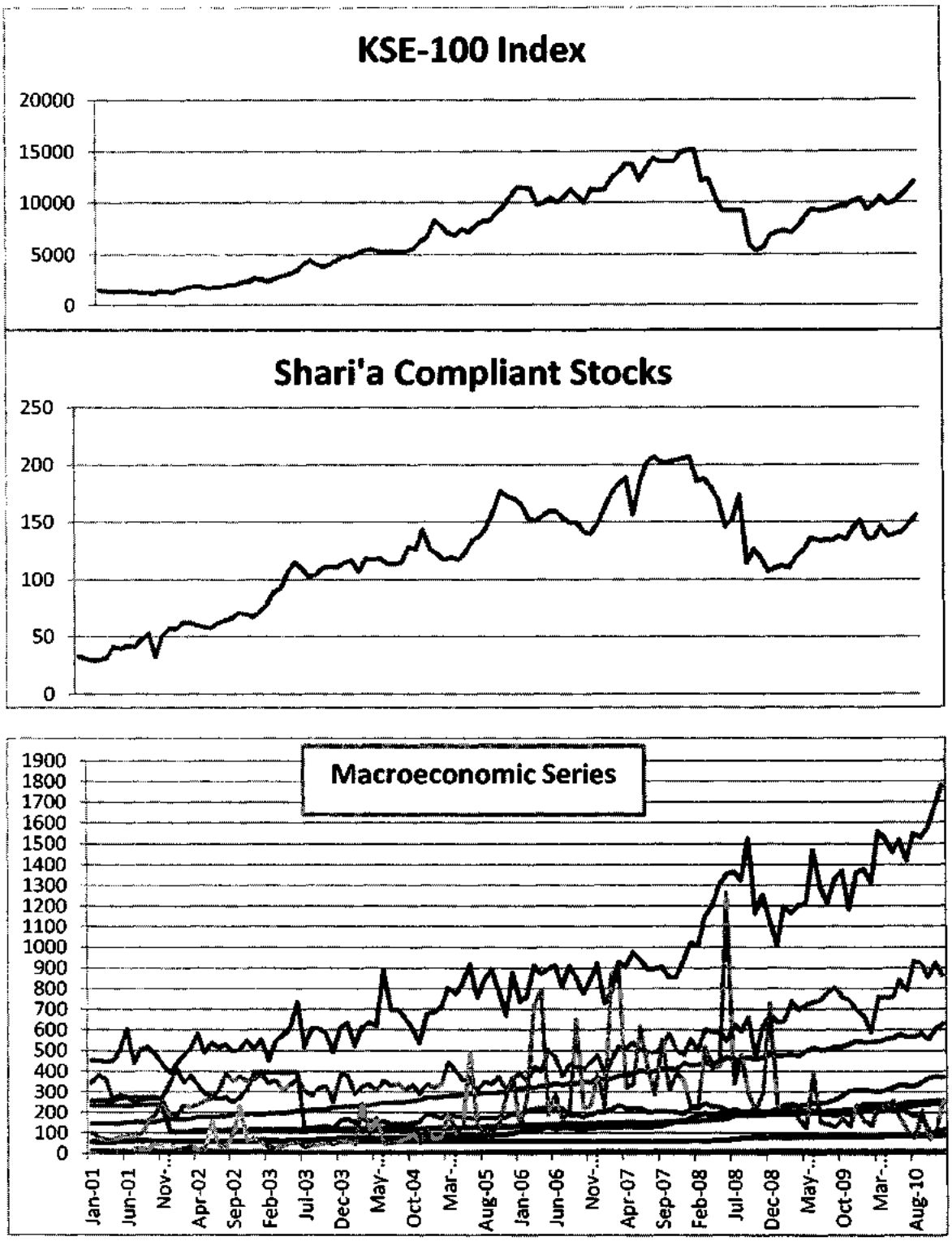
RESEARCH METHODOLOGY

This chapter covers research methodology including theoretical frame work, data collection, analysis tools, econometric models and software used in compilation of results. A detailed account of working plan is presented as how we proceeded to achieve research objectives with focus on application of CAPM, SCAPM, multifactor model, macroeconomic variables, selection and measurement, Fama & French three factors model and extended Fama & French model.

4.1. Data

Sample includes the total 100 Shari'a compliant equities [except three financial sector companies] screened by Shari'a experts of Al-Meezan Investment Management Ltd; (AIML) as at December 31, 2009. All securities forming KMI-30 are included being part of list of 100 companies. 41 companies are common in KSE-100 index and Shari'a compliant universe. These 41 companies cover 59% of market capitalization of KSE-100 index in 2010. Security prices were taken from DataStream and missing companies' price seires (if any) were obtained through KSE website and Ksestocks.com.

Figure 4-1 Trends in KSE-100 Index, Shari'a compliant stocks and Macroeconomic Series



Trends in series of equally weighted Shari'a compliant sample, KSE-100 index and macroeconomic variables are shown in Figure 4-1during the period under review. From the figure a bird's eye view of co-movement of stock prices of KSE-100 Index and Shari'a compliant sample appears, however much variations exist in macroeconomic variables. Monthly macroeconomic data was obtained from the statistics department of State Bank of Pakistan. Firm specific variables are calculated directly from balance sheet analysis of joint stock companies prepared by the state bank of Pakistan. Out of 100, three financial companies were taken out and final sample composed of 97 companies only. We used risk free rate from national savings certificate [regular income certificates] issued by the government of Pakistan. Following (Chen, Roll & Ross 1986; Mukharjee & Naka, 1995; Kavussanos, Marcoulis & Arkoulis 2002; Chancharoenchai, Debooglu & Mathur 2005; Rjoub, 2009; Hasan & Javed 2009 and Rao & Ramachandran 2009) ten years monthly data from 2001 to 2010 was used to test the impact of micro & macroeconomic variables on security prices. Analysis conducted by using MS-Excel and E-views 8.

4.2. Capital Asset Pricing Model

In order to apply capital asset pricing model, we selected monthly returns of selected companies, risk free rate [national savings' regular income certificates] and monthly returns of KSE-100 Index. For application/testing of SCAPM, we replaced risk free rate with inflation. Monthly Prices converted into returns by applying following formula:

$$R_t = ln(P_t/P_{t-1}) \qquad (4\text{-}1)$$

ln is natural log; R_t is return in month t; P_t is price of month t; and P_{t-1} is price in previous month. From balance sheet for each company size (market price * number of shares), book to market (book value per share/ market price per share) cash flow yield (cash flow per share/MPS) and price to earnings (MPS/ EPS) was calculated. After converting data into information OLS regression applied as follows. First regression on sample, second regression on big companies and third on small companies, sorted on the basis of previous year closing size (measured through market equity) in order to note the difference. Further this study also run the regression by breaking the whole sample into two portfolios (high B/M and low B/M) annually on the basis of median book to market ratio, median CFY (high CFY and low CFY) and on the basis of price to earnings ratio (high PER and low PER). This research also broken the sample according to the median value of size, B/M, CFY and PER, in order to document the differences in average returns and Beta. As per CAPM theory a portfolio with higher return should have higher beta (proxy for risk). As for size and book to market is concerned, international evidence on CAPM anomalies, is available and in this study we want to check robustness of the results on KSE, however PER and CFY is included being performance indicator of a company to check their role in stock price variations. We have tested basic equation of CAPM with certain modifications of variables. We have also tested Shari'a compliant asset pricing model (SCAPM), by replacing RFR with inflation.

4.3. Multifactor Model-Macroeconomic Variables

4.3.1. Variables Selection

According to Chen, et. al (1986) "No satisfactory theory would argue that the relation between financial markets and the macro economy is entirely in one direction. However stock prices are usually considered as responding to external forces.....By the diversification argument that is implicit in capital market theory, only general economic state variables will influence the prices of large stock market aggregates". The purpose of this study is to search for determinants of cross section stock returns, so we have included possibly maximum macroeconomic variables, which can be justified theoretically, as for any linkage is concerned with cross section stock returns. Finally following ten macroeconomic variables are selected.

4.3.1.1. Exchange Rate

In free market economy, exchange rate is determined through demand and supply of the foreign exchange within the economy. Any movement in exchange rate is expected to affect firms' cash flows (e.g. an increase in exchange rate would result in cheaper goods abroad, hence increase in cash flows for domestic firms through more demand in international market and vice versa). US $ being international currency is used as representative of foreign exchange for this study. Exchange rate proxy is calculated in terms of value of one US $ in domestic currency i.e. Pakistani rupees (PKRs). Empirical evidence exists about the relationship between exchange rate and stock returns (Mukherjee &Naka, 1995; Kwon & Shin 1999; Qayyum & Kemal 2006; Hasan & Nasir, 2008; Hasan & Javed 2009; Mohammad et. al. (2009), Butt & Rehman 2010; Akash, et al; 2011). As upward movement in exchange rate increases revenue through sales in

international market [although increases costs of imports], hence the expected relationship is positive through trade channel. However, this is only one part of the effect of exchange rate movement on stock prices. Another possibility of exchange rate effecting stock returns is through investment channel whereby depreciation in domestic currency reduces the stock return of foreign investor. Consequently, impact of exchange rate would be negative. Hence, the net effect of exchange rate on stock returns could be both positive as well as negative.

4.3.1.2. Inflation

Inflation is an increase in the general price level resulting in a decrease in purchasing power. Any movement in inflation has an impact on stock returns and prices. Increase in inflation increases the cash flows for firms leading to higher prices of stocks and greater capital gains to investors. Given the rise in earnings and cash flows, expected relationship of inflation and stock returns is positive. However inflation also leads to higher cost of capital required by investors and increase in risk free rate, consequently increases discount rate and reduces returns from stock. Adjustment process may be slow and input prices may increase earlier than realization of cash flow through output. Through empirics it is also established that inflation has negative relation with stock returns, hence it is hypothesized that inflation may have negative impact on stock returns. Three types of inflation indexes are available in Pakistan including Sensitive Price Index (SPI), Consumer Price Index (CPI) and Wholesale Price Index (WPI). For this study CPI is selected as proxy for inflation. Empirical evidence about the relationship between inflation and stock returns has been documented in many studies including Roll and Ross

(1980, 1983), Chen et. al; (1986), Mukharjee & Naka (1995), Ibrahim & Aziz (2003), Adel (2004), Nishat & Shaheen (2004), Gan, Lee, Yong and Zohang (2006), Patra & Poshakwale (2006), Akash, et. al. (2011).

4.3.1.3. Interest Rate

Interest rate offered by the government of a country to get loan from its nationals is an investment avenue for savers and generally considered as the most secure form of investment, such returns are known as risk free returns. In valuation models as well as for determination of required return on a project this risk free rate plays very vital role. Required rate of return is risk free rate plus risk premium depending upon risk level of an investment. National savings certificate, defense savings certificate and other bonds of government corporations guaranteed by the government of Pakistan are the examples of risk free return opportunities in domestic market. Keeping in view risk free rate offered by government, Inter Bank offered Rate (IBOR) is determined which signifies return rate in private sector investments. IBOR is the bench mark for private sector financing. An upward movement in interest rate creates opportunity for investor to invest in government securities resulting decrease in stock returns. Also higher interest rate increases cost of capital for firm which leads to lower cash flows for firms. Signaling theory postulates that cash flows are priced by market which further strengthens the negative relationship between interest rate and stock returns. For this study lending rates of banks are selected as proxy for interest rate as this rate contributes in weighted average cost of capital and also determines private sector bonds market rate. Interest rate variable was tested in many studies including Chen, Roll & Ross (1986), Kwon & Shin (1999), Mukherjee & Naka

(1995), Adel (2004), Rizwan & Khan (2007), Coleman & Tettey (2008), Srivastava (2010). Expected relationship is negative as interest rate increases discount rate for investment analysis, which is also documented by Hasan & Nasir (2009) for KSE.

4.3.1.4. Industrial Production

Industrial production is the index of manufacturing in the economy which is maintained monthly. It is used as proxy for GDP of economy (as monthly data for GDP is not available for Pakistan) and depicts the overall economic activity in the society. As it is the proxy of national level output, hence a significant positive impact on stock returns is expected. Although using of IPI as proxy for GDP is questioned very rightly by certain quarters as in domestic market share of manufacturing is less than a quarter, however as no other variable is available to proxy the GDP, and hence we have to rely on this. Vast literature on the relationship of industrial production and stock returns exists (Mukerjee & Naka, 1995; Kvon & Shin, 1999; Ibrahim & Aziz, 2003; Adel, 2004; Nishat & Shaheen, 2004; Hasan & Nasir, 2008; Hasan & Javed, 2009a; Butt & Rehman, 2010; and Akash et al; 2011). Increase in industrial production is a signal of economic activity and more revenues to firms, hence expected relationship is positive.

4.3.1.5. Foreign remittances

Foreign remittances represent the inflow of foreign currency remitted by expatriates to their families and relatives which enhance purchasing power substantially in domestic market. These cash flows can directly be used by locals to invest in stock market while indirect impact on stock returns through increased demand for goods and services cannot

be denied. Given the increased purchasing power positive relationship is expected. Inclusion of this variable in this study is encouraged by the fact that there has been a substantial increase in foreign remittances during the study period. (Economic Survey 2012)

4.3.1.6. Foreign direct investment

FDI is the capital inflow in an economy from other countries and plays very vital role in economic development and general uplift in standards of living through creation of jobs and providing sufficient foreign currency for import of required goods. As foreign investment can lead to growth and expansion in domestic output, hence a positive relationship is expected between foreign investment and stock market movements (Shahid, 2008; Hasan & Nasir, 2009; Akash et. al; 2011). Any of the three variables including foreign exchange reserves, foreign direct investment and foreign portfolio investment can be used as proxy. This study uses foreign direct investment as proxy for foreign investment because of active and long term holdings by foreign investors, resulting in long term impact on the economy. Given the expansion and growth in economic activity due to foreign direct investment, a positive relationship is expected with stock market returns.

4.3.1.7. Money supply

MS is the total currency in circulation in the economy and changes in the quantity of money could have significant impact on the economic growth and development resulting in variation in stock prices. Money supply has been broadly classified as M2 and M1,

where M1 includes all physical money such as coins and currency; it also includes demand deposits while M2 includes M1 in addition to all time-related deposits, savings deposits, and non-institutional money-market funds.[16] Money supply movements affect the purchasing power of consumers and cash flows for investors. It is expected that increase in money supply will increase inflation and hence cash flows to the firms enabling them to pay higher dividend leading to more demand for stocks. Also monetary expansion leads to lower interest rates, resulting in lower cost of capital leading to higher cash flows for firms. Moreover, lower interest rates will shift investment from risk free investment options to stock market. For this study, M2 is selected as proxy for money supply. Prior literature has documented the relationship of stock returns and money supply including Mukherjee & Naka (1995), Ibrahim & Aziz (2003), Al-Sharkas (2004), Gan et. al; (2006), Chancharat & Valdakhani (2007), Fama (1981), Liu & Shrestha (2008), Kandir (2008), Patraa & Poshakwaleb (2006), Hasan & Nasir (2009). Expected relationship between money supply and stock prices is positive.

4.3.1.8. Oil Prices

Oil & Gas being the source of energy plays significant role in the world economy including Pakistan. Any shift in oil prices leads to shift in economic activity leading to an effect on cash flows of firms resulting in movement in demand and supply of equity stocks. Literature has documented relationship of oil prices with stock returns (e.g. Chen et al; 1996, Gan et. al; 2006, Chancharat & Valdakhani 2007, Kandir 2008, Hasan & Nasir 2009). As the oil prices increases, cost of production also increases, resulting in

[16] http://www.investopedia.com/terms/m/m2.asp#ixzz1o8etc6Ct accessed on March 4, 2012.

lesser profits for firms, which is compensated through increased prices, consequently higher stock returns. However it depends upon adjustment process, as how early it is being completed. Expected relationship is negative between oil prices and stock returns.

4.3.1.9. Exports

Exports depict the total goods sold in international market by an economy and generally higher exports mean more economic activity in domestic market. Higher economic activity leads to overall prosperity and increased purchasing power in the society. Businesses flourish and income of residents' increases, resulting in savings, hence capital formation takes place. Additional capital is expected to be invested directly/indirectly, which increases demand for equity securities, resulting in higher prices and more returns. It is expected that export could positively affect the stock returns hence this variable is selected as predictor of stock returns. Also higher exports increase cash flows to the firm which are positively priced at stock market.

4.3.1.10. Gold prices

Gold prices have shown tremendous variations in recent years and this sector has become an alternate market for investors. It is expected that gold market can be used for diversification of portfolios leading to a negative relationship with stock returns. Faff & Chan, (1998) concluded that the only variables of significant explanatory power are the market and gold price factor. Expected relationship is negative.

All of the variables are identified through literature study or widely accepted theory and have proved their worth in domestic as well as global market. However the sample is

unique in its nature as no previous study has been conducted on Shari'a compliant securities, hence, literature is silent about the predictors of Shari'a compliant stock returns. It is expected this study will assist in the development of a valuation model for Shari'a compliant stocks. This study shall determine the significance of each variable as predictor of Shari'a compliant stock returns in domestic market.

4.3.2. Analysis/Tests

Descriptive statistics including mean, median, standard deviation, coefficient of variation, kurtosis and skewness of the selected time series are calculated. To study the impact of macroeconomic factors listed above on security returns two approaches have been used in the literature. While analyzing stock returns and identifying valuation factors, two types of methodology are used; either firm level analysis or portfolio level analysis. Following Roll & Ross, (1980), Dhrymes, et. al., (1984), Fama & French (1973, 1993), Pontiff & Schall (1998), Lewellen (2002) and Hasan & Javed, (2009), this study uses portfolio analysis due to following reasons. First is its practicality; rational investors always prefer to hold portfolios instead of individual securities. Second is normality; abnormalities among returns of individual securities are averaged out in the portfolio analysis hence the results are more reliable. Equally weighted portfolio of all sample companies is created. Unit of analysis is monthly log-price observations of time series for ten years hence 120 price observations of each company and 120 index observations of each macroeconomic variable are being used in regression test. Monthly data for macroeconomic variables (being independent), is available from State Bank of Pakistan to run the regressions. To minimize the differences in data series log of prices and macroeconomic variables

calculated. Multi-co linearity test is essential for this study due to the large number of independent variables and the likely relationships among them; if strong positive or negative correlation exists between any two variables then both cannot be included in the single regression model. Multi-co linearity test is applied and results are reported.

4.4. Multifactor Model-Microeconomic Variables

In our sample about 71% companies having closing in June and 20% companies were closing in December, while 7% and 2% in September and March respectively. Our first month of analysis is January which means 80% companies have public the data, while our assumption about 20% companies closing in December is that summary figures were started to reach in the market in first following month. Nevertheless as for about 80% companies are concerned detailed accounting data in the form of annual report was well before hand available to investors (as at average, holding of AGM was taken 107 days after closing, in 2009). This research started analysis with the gap of six months for 73% companies and in fourth month or longer for 80% companies.

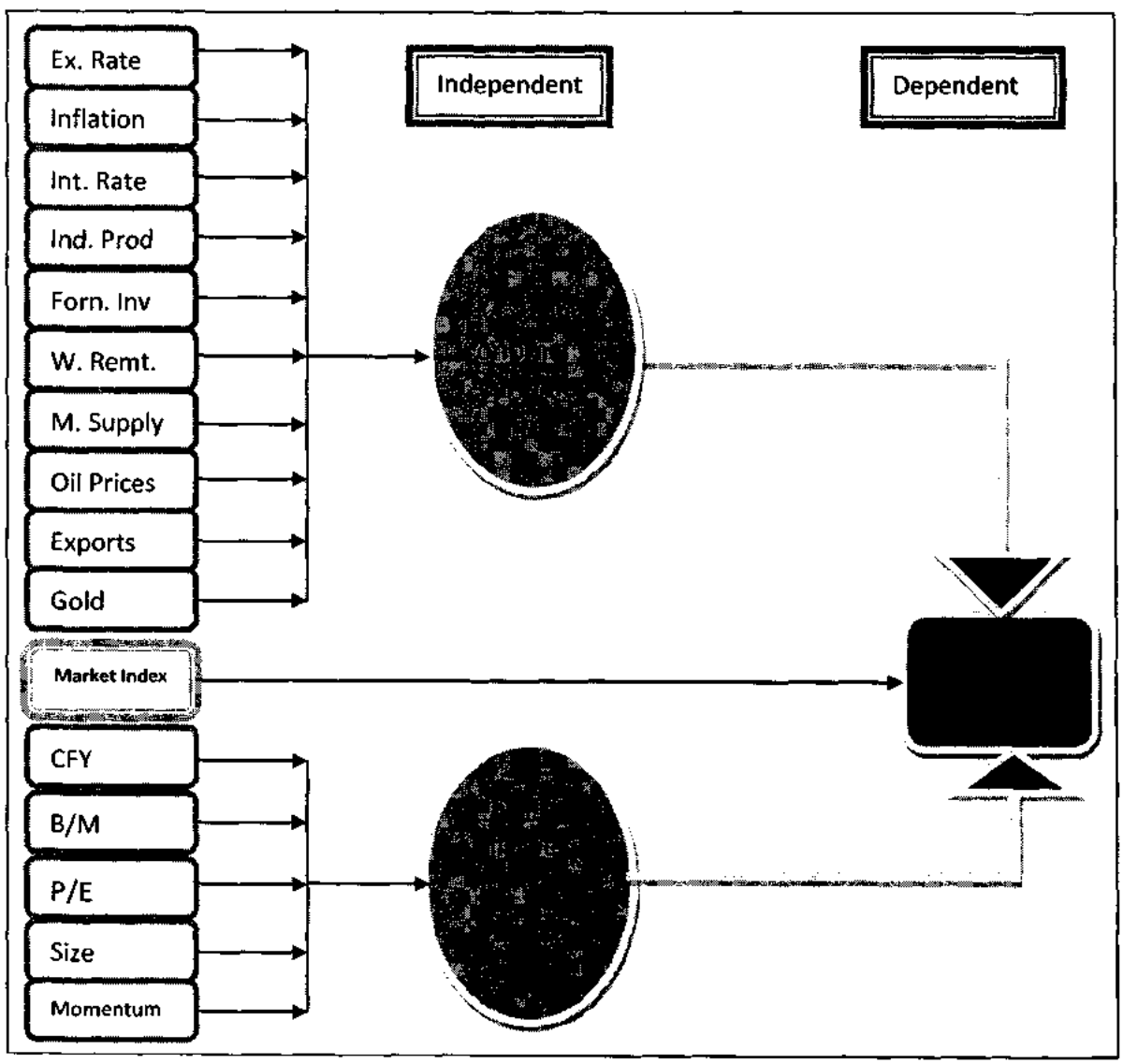
As a first step in analysis this study followed methodology of Fama and French 1992, whereby companies are distributed in six portfolios, sorted by size and book to market. In this research, we could not follow Fama (2000) methodology, whereby companies were distributed in nine portfolios, due to small number of companies. This study used the market value of December (year t-1) in order to sort the portfolios on size. Every year average returns of the companies were sorted on the basis of previous year market value of equity. Companies were divided into two parts as big and small on the basis of median market value of equity. Companies with larger than median market

equity were included in Big companies portfolio and others in Small companies portfolio. Simultaneously whole companies in sample were distributed in three groups based on Book to market equity of previous year December, and constructed six portfolios based on intersection of size and book to market equity including B/H, B/M, B/L & S/H, S/M, S/L. I calculated size premium SMB (small minus big) as follow. SMB=1/3 (S/H + S/M + S/L) – (B/H + B/M + B/L); and calculated value premium HML (high minus low based on B/M) with the application of following formula; HML= ½ (S/H + B/H) – (S/L + B/L).

In the second phase of the study, where extended FF was used by inclusion of PER and Momentum, following methodology was used. Six independent variables including market index, PER, SIZE, B/M, CFY and momentum in a single regression model to check the explanatory power as well as significance of variables. To calculate RM, we have deducted risk free return from average monthly returns of market portfolio. In order to obtain SMB, procedure of FF is used. Every year companies' returns were sorted on the basis of previous year market value of equity and sample broken into Big and high on the basis of median size. For HML I have used different procedure than FF and companies were sorted on the basis of book to market ratio of previous year figures on the day of closing. Sample broken into two parts as High and Low based on median figure of B/M ratio, by following Ammann et al (2008). To get the figure of LMH-low minus high- based on PER as in my calculations in CAPM, low PER companies out performed high PER companies, this study arranged companies in order based on last year's accounting figure on earning. Sample broken into two parts as low PER and high PER based on median figure. Momentum variable is used to account for market noise, first identified by Jagdeesh and Titman (1993) and later on used by Carhart (1997) and

Ammann & Steiner (2008). Results are presented as descriptive statistics, trends in series, Multi-co linearity and regression analysis.

Figure: 4-2 Theoretical Frame work.



4.5. Theoretical Framework

This study examines the relationship of fundamental and macroeconomic variables with stock returns. Figure 4-2 presents graphically independent and dependent variables. In this study two sets of variables (macroeconomic and fundamentals) are independent

while stock returns are dependent variable as illustrated in following figure. Macroeconomic variables included are exchange rate, inflation, interest rate, industrial production index (proxy for GDP), and foreign investment, remittances of expatriates, money supply, oil prices, exports and gold prices. While fundamental variables included are price earnings (P/E), book to market (B/M), cash flow yield (CFY) and size (ME).

4.6. Econometric Models

To test first hypothesis (impact of market index on stock returns & CAPM anomalies) following regression model (with modification of portfolio returns) has been used.

$$R_{pt} - R_f = B_j (R_m - R_f) + \varepsilon \quad (4\text{-}2)$$

To test sub hypothesis (SCAPM), following regression equation was applied.

$$R_{pt} - N_t = B_j (R_m - N_t) + \varepsilon \quad (4\text{-}3)$$

Where R_{pt} is the portfolio return; N_t is inflation rate; R_m is return on market index; R_f is risk free rate; and ε is error term.

To test second hypothesis (impact of macroeconomic variables on stock price variations) following regression model has been used.

$$(LP_{Pt}) = A_0 + A_1 (LXR_t) + A_2(LPI_t) + A_3(LIR_t) + A_4(LIP_t) + A_5(LFDI_t) + A_6(LWR_t) + A_7(LMS_t) + A_8(LOP_t) + A_9 (LGP_t) + A_{10} (LEX_t) + (LKSE_t) + \varepsilon \quad (4\text{-}4)$$

Whereby L is for log:

R_{pt} = Return on Portfolio

A_0 = Intercept (Constant)

XR = Exchange rate

PI = Inflation (price index)

IR = Interest rate

IP = Industrial production

FI = Foreign direct investment

WR = Remittances of expatriates

MS = Money supply *OP = Oil prices*

GP = Gold prices *EX = Exports*

ε = Error term

To test third hypothesis (application of FF three factors mode on Shari'a compliant stock returns) following econometric model was applied.

$$R_p - R_f = a + b\,(R_m - R_f) + b_s\,SMB + b_h HML + \varepsilon \qquad (4\text{-}5)$$

Where by R_p is portfolio return; a is intercept; b is beta coefficient; R_m is return on market index; SMB is average returns on small portfolios minus big portfolios based on size; HML is average returns on High portfolios minus low portfolios, based on book to market ratio and ε is error term.

To test fourth hypothesis, the modified and extended FF model, following econometric model applied.

$$R_p - R_f = a + b\,(R_m - R_f) + b_s\,SMB + b_h HML + b_p LMH + b_f HMLCF + b_m WML + \varepsilon \qquad (4\text{-}6)$$

Where by R_p is portfolio return; a is intercept; b is beta coefficient; R_m is return on market index; SMB is average returns on small portfolios minus big portfolios based on size; HML is average returns on High portfolios minus low portfolios, based on book to market ratio; LMH is average returns on low portfolios minus high portfolios based on price to earnings ratio; HMLCF is high minus low portfolio return based on cash flow; and WML is average returns of winners minus losers in past and ε is error term.

RESULTS AND DISCUSSION

Chapter 5- Capita Asset Pricing Model

Chapter 6- Macroeconomic Factors

Chapter 7- Microeconomic Factors

CHAPTER 5

CAPITAL ASSET PRICING MODEL

This chapter of analysis is dedicated to calculate and interpret influence of market index on returns of Shari'a compliant cross section returns. It includes testing of CAPM, SCAPM, calculation of return differences based upon size, B/M, PER and CFY. It also includes descriptive statistics, multicolinearity and regression analysis based upon purpose built portfolios of stock returns. In order to achieve research objectives and testing of hypothesis this study conducted following analysis using EViews 8 and MS Excel software. We used OLS regression technique for capturing influence of market index (independent variable) on returns of Shari'a compliant sample (dependent variable)

1. Descriptive statistics
2. Trends in stock Returns
3. Difference in stock returns of portfolios based on Size, B/M, CFY and PER
4. Regression Market Index on average returns of Shari'a Compliant Sample, Big (in size) companies' portfolio, Small (in size) companies' portfolio, High book to market companies' portfolio, Low book to market companies' portfolio High PER companies' portfolio, Low PER companies' portfolio, High CFY companies' portfolio and Low CFY companies' portfolio.

5.1. Descriptive Statistics & Trends

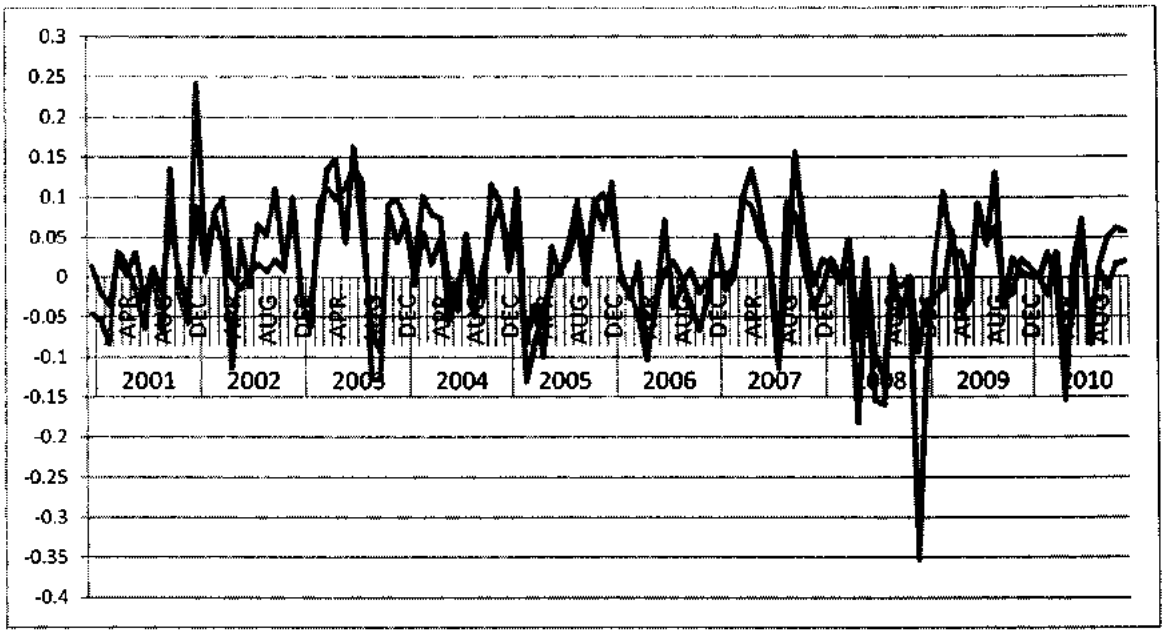
Descriptive statistics are presented in Table 5-1. Mean values are very closer to median, which shows data is normal and almost free of effects of outliers. The highest level of variation was found in low CFY, followed by returns of low B/M, big companies, high PER and average returns of sample. Single highest figure of standard deviation is found in KSE index returns, followed by low CFY, big companies portfolio and least in risk free rate. Maximum monthly change was found in returns of big companies (based on market capitalization), followed by KSE returns, low PER and high B/M portfolios returns, while least in RFR.

Table 5-1. Descriptive Statistics of Return Series-CAPM

Description	*KSE*	*SA*	*RFR*	*PI*	*High-PER*	*Low-PER*	*High B/M*	*Low B/M*	*Big*	*SMALL*	*High CFY*	*Low CFY*
Mean	0.017	0.010	0.008	0.008	0.009	0.015	0.016	0.007	0.009	0.014	0.020	0.007
Median	0.019	0.008	0.008	0.006	0.007	0.011	0.013	0.008	0.014	0.008	0.020	0.010
St. Dev.	0.089	0.062	0.002	0.009	0.064	0.073	0.071	0.066	0.079	0.061	0.065	0.072
C. of Var.	5.321	6.064	0.218	1.121	7.355	4.928	4.289	9.508	8.453	4.349	3.11	10.41
Kurtosis	5.844	0.919	-0.92	0.706	0.165	1.028	0.860	0.560	3.197	0.008	0.2828	1.212
Skewness	-1.21	-0.58	0.127	0.796	-0.414	-0.380	-0.285	-0.505	-0.89	0.107	-0.377	-0.717
Maximum	0.241	0.147	0.013	0.033	0.144	0.223	0.209	0.141	0.242	0.162	0.1698	0.1533
Count	120	120	120	120	120	120	120	120	120	120	108	108

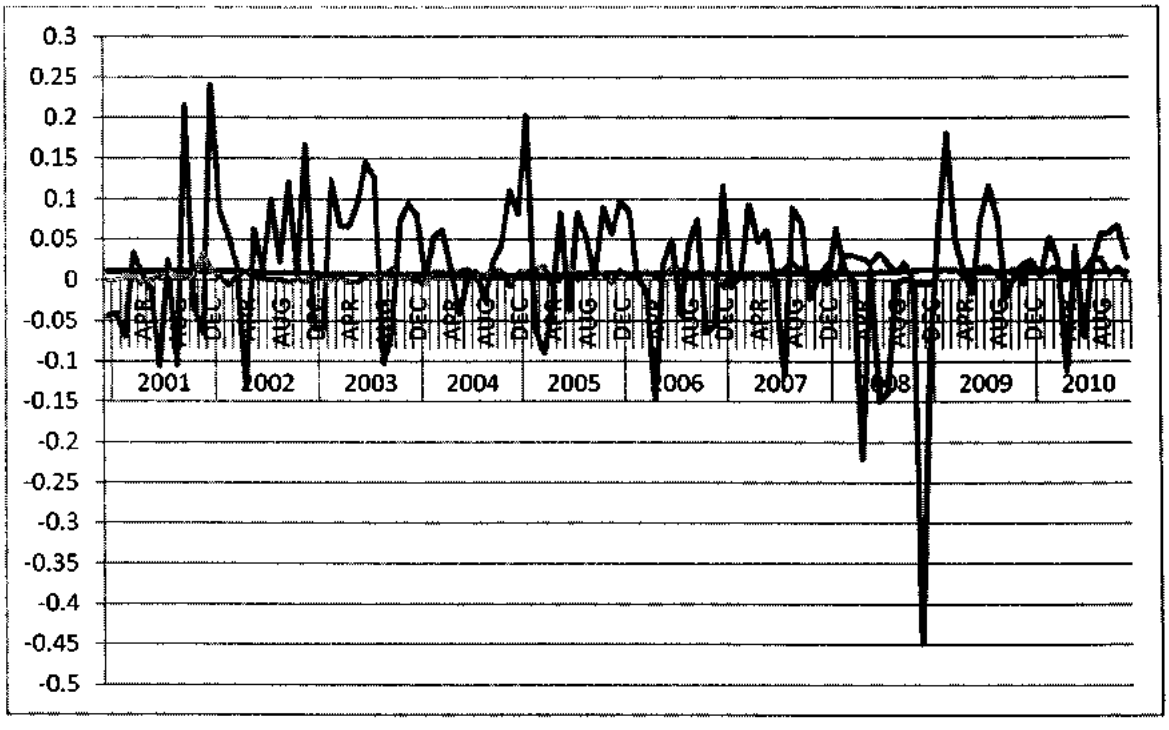
Trends in return series are presented in graphic form in Figures 5-1,2,3,4,5 as under.

Figure 5-1. Trends in returns of Size based series



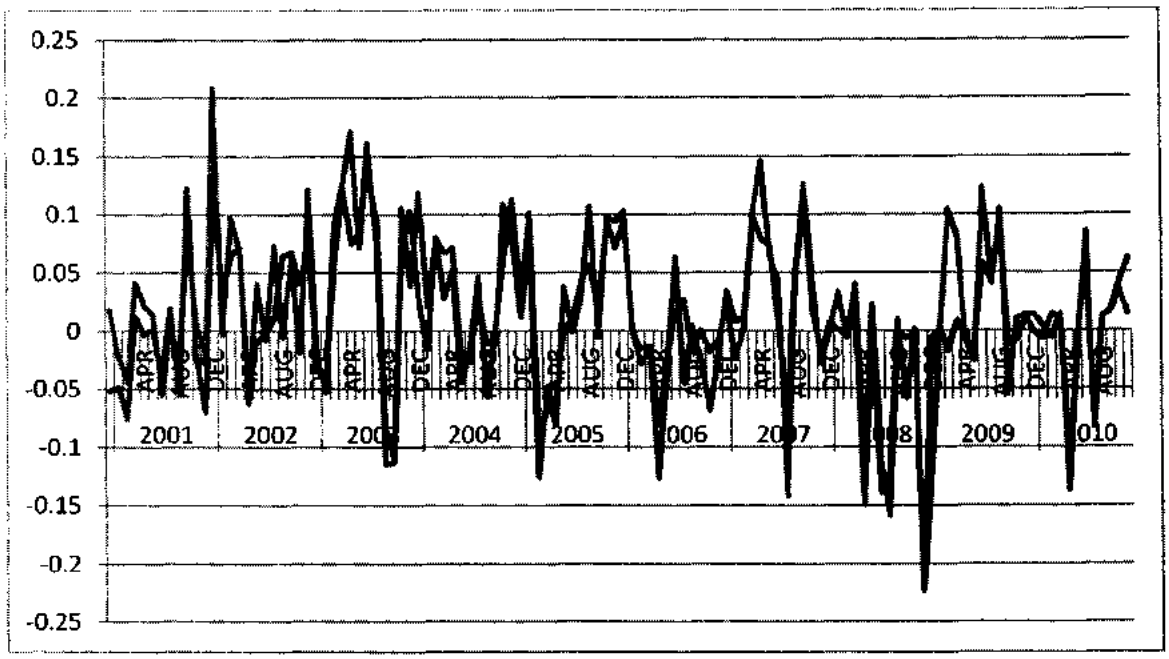
__Big __Small

Figure 5-2. Trends in returns of KSE, RFR and Inflation series



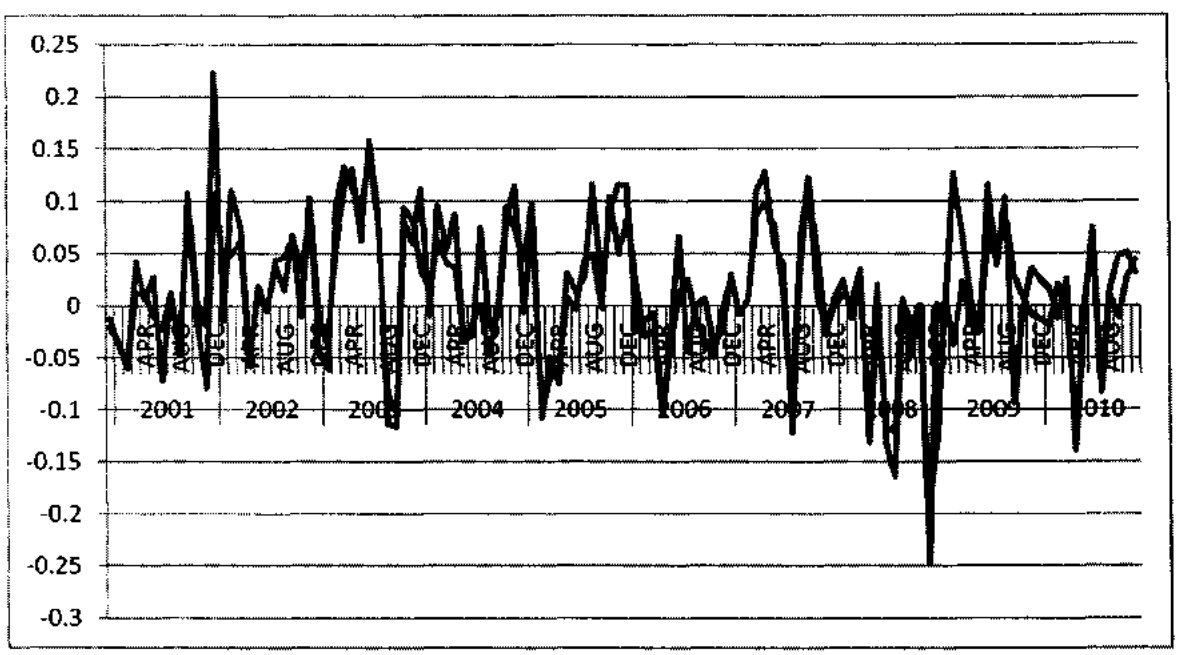
___KSE ___RFR ___PI

Figure 5-3. Trends in returns of Book to Market based series



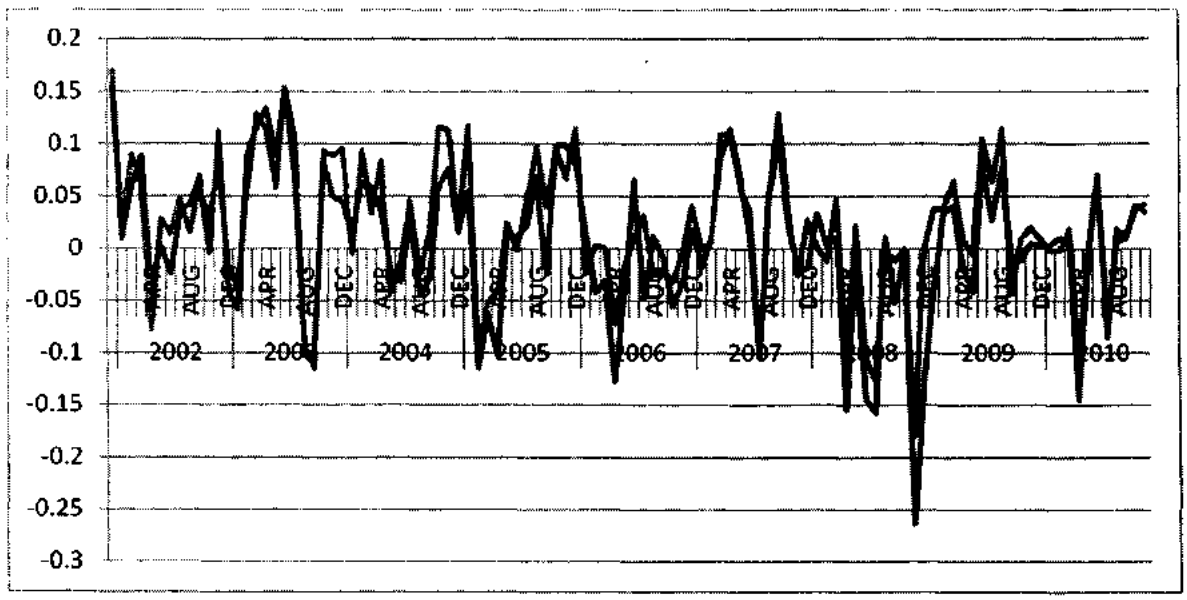
__High B/M __Low B/M

Figure 5-4. Trends in returns of Price to Earnings based series



__High PER __Low PER

Figure 5-5. Trends in returns of Cash Flow based series



__High CFY __Low CFY

5.2. Difference in Stock Returns

Difference in stock returns is presented in Table 5-2. As per results under size based portfolios although results are mixed and out of ten monthly and annually returns, five are positive and five are negative, however overall results for ten years of SMB are positive. In fact small firms outperformed big firms by 0.46% average per month returns and 5.61% average per year during sample period (2001-10). As per CAPM theory beta coefficient of small firms should be high and of big firms should be low, given the returns provided (required) by investors.

In case of book to market distribution of sample (as high B/M and low B/M) results are calculated as HML (average returns of high book to market companies minus average returns on low book to market companies), presented in Table 6-2. High B/M

companies have outperformed low B/M Companies in monthly average returns as well as annually. Out of ten years' figures presented in Table 5-2, seven times HML is positive and only three times it is negative. In fact high B/M companies have provided superior return to investors at an average 00.95% per month and 11.50% per year. As per CAPM theory beta coefficient of high B/M companies should be more than of low B/M companies.

Table 5-2. Differences in Stock Returns based on Size, B/M, PER and CFY

Description	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
SMB-Monthly	0.0187	-0.0189	-0.0012	0.0208	-0.0143	0.0115	0.0083	0.0431	-0.007	-0.014	**0.0046**
SMB Annually	0.2246	-0.2272	-0.0146	0.2496	-0.1717	0.1378	0.0999	0.5174	-0.0849	-0.167	**0.0561**
HML B/M Monthly	0.0187	0.0078	-0.0017	0.019	-0.0011	0.014	0.0007	0.0128	0.023	-0.004	**0.0095**
HML B/M Annually	0.2238	0.0938	-0.0210	0.228	-0.0137	0.1684	0.008	0.1536	0.3595	-0.051	**0.1150**
HML PER Monthly	-0.009	-0.0062	0.0053	-0.021	-0.0084	0.0023	-0.004	0.0043	-0.0260	0.0022	**-0.0062**
HML PER Annually	-0.112	-0.0748	0.0644	-0.260	-0.1010	0.0273	-0.050	0.05252	-0.3128	0.0269	**-0.0741**
HML CFY Monthly		0.0026	-0.0019	0.0213	0.0196	0.0142	0.0085	0.0243	0.0329	0.0037	**0.0139**
HML CFY Annually		0.0321	-0.023	0.2561	0.2353	0.1711	0.1022	0.2925	0.3957	0.0450	**0.1675**

In case of price earnings ratio (PER), whole sample was broken on the basis of median PER into two parts (portfolios) as high PER and low PER portfolios. Results are presented as HML-PER (returns on high PER minus low PER portfolios). Out of ten averages of monthly, as well as annual return; six times low PER portfolio shown better results than High PER portfolios and at average low PER displayed superior results of

0.62% per month and 7.4% per year. As per CAPM model beta coefficient should be more for low PER companies as compare to high PER Companies.

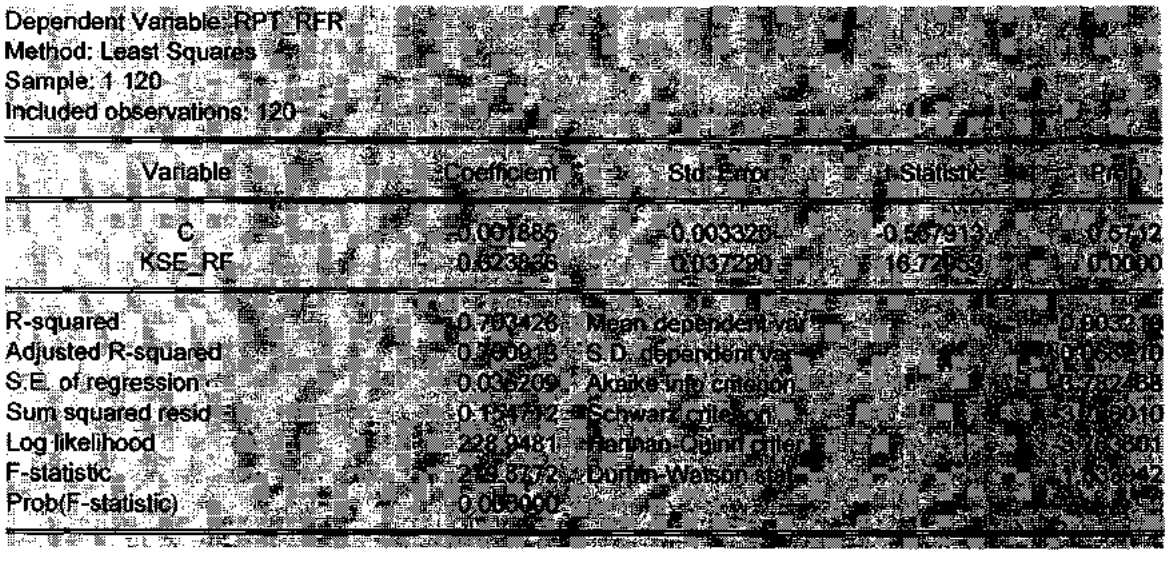
In order to document impact of cash flow, this study divided sample in two portfolios based on median CFY. Difference in average returns was calculated on monthly as well as annually. Monthly average difference in returns was 1.39%, while annually 16.75%. As per CAPM beta of HFCY should be more than LFCY. To test the theory of CAPM, we have conducted regression analysis based on size, B/M, PER and CFY, and results are reported in following section.

5.3. Regression Results

As per CAPM, market index capture the variation in returns of companies and Beta coefficient represents systematic risk, hence we started analysis by applying the basic model of CAPM as under and results are presented in Table 5-3.

Table 5-3 Regression Results of Basic CAPM

$$R_{pt} = R_f + B_j (R_m - R_f) + \varepsilon$$



Dependent Variable: RPT_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001886	0.003329	0.566913	0.5742
KSE_RF	0.623836	0.037290	16.72853	0.0000

R-squared	0.703426	Mean dependent var	0.003319
Adjusted R-squared	0.700913	S.D. dependent var	0.065970
S.E. of regression	0.036209	Akaike info criterion	-3.782488
Sum squared resid	0.154792	Schwarz criterion	-3.713010
Log likelihood	228.9481	Hannan-Quinn criter.	-3.754361
F-statistic	279.8772	Durbin-Watson stat	1.830442
Prob(F-statistic)	0.000000		

According to results, overall explanation of variation in stock returns is 70% and market coefficient is 62%. Intercept is statistically insignificant; hence rate on Regular Income Certificate (RIC) used in this study is a good proxy for risk free return. Durbin-Watson statistics is good and results are reliable. Fitness of model to data is good as depicted by F Statistics at 1% significance level. Risk premium calculated as share of sample based on Beta from market risk premium is statistically significant at 1% level, however market coefficient is 62% which means market explains variations up to this level and 38% variations in stock returns are contributed by other factors.

Table 5-4 Regression Results of SCAPM

$$R_{pt} = PI_t + B_j (R_m - PI_t) + \varepsilon$$

Dependent Variable: RPT_PI
Method: Least Squares
Sample: 1 120
Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001687	0.003372	-0.500432	0.6177
KSE_PI	0.635475	0.037335	17.02079	0.0000

R-squared	0.710577	Mean dependent var	[illegible]
Adjusted R-squared	0.708124	S.D. dependent var	[illegible]
S.E. of regression	0.036751	Akaike info criterion	[illegible]
Sum squared resid	0.159378	Schwarz criterion	[illegible]
Log likelihood	227.1654	Hannan-Quinn criter.	[illegible]
F-statistic	289.7073	Durbin-Watson stat	[illegible]
Prob(F-statistic)	0.000000		

As we are working with a special sample of companies, which is Shari'a compliant and concept of risk free rate is not present under Islamic financial system, hence we replaced risk free returns in basic model of CAPM with inflation, as suggested by Hanif, (2011), and results are presented in Table (5-4). According to results adjusted R

Square, Beta coefficient of market and F statistics has shown slight improvement, while Durbin-Watson statistics reduced very slightly. We can conclude that in local market, during period under review behavior of risk free rate and inflation remained complementary and also SCAPM is equally practicable in addition to CAPM. In fact we got slightly better results through SCAPM as compared to basic equation of CAPM, although in calculation it does not make much difference, however theoretically SCAPM is recommended for valuation under Islamic financial system. As this study regressed the risk premium only, by deducting risk free rate from average portfolio returns as well as from market index returns, hence ideally intercept should be zero. Although negative intercept is about $1/5^{h}$ of 1% per month, however statistically insignificant.

In order to check validity of CAPM across cross-sections returns, we divided sample into two portfolios as big and small based upon market capitalization of underlying companies. Regression results of Big (size based) portfolio are presented in Table (5-5). In case of big companies, results are even better and during period under review market index explained variation up to 80%, at 1% significance level. Intercept is statistically insignificant, in line with theory, as we regressed excess return of market and Shari'a compliant sample. Value of adjusted R Square reached to 81% with good Durbin-Watson statistics. Overall fitness of model is good as depicted by a very high value of F statistics at 1% significance level. One of the reasons of high association of big companies with market index is the makeup of market index itself.[17]

[17] KSE-100 index includes 34 big companies of each sector, while rest 66 companies are selected openly from stock universe based on market capitalization; hence use of market index as a proxy for portfolio of risky assets is itself questionable.

Table 5-5. Results of Regressions for Big Companies based upon Size-CAPM

$$R_{pbt} = R_f + B_j\,(R_m - R_f) + \varepsilon$$

Dependent Variable: BIG_RF
Method: Least Squares
Sample: 1 120
Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.005728	0.003122	-1.834777	0.0691
KSE_RF	0.807019	0.035073	23.00970	0.0000

R-squared	0.817747	Mean dependent var	[illegible]
Adjusted R-squared	0.816202	S.D. dependent var	0.079439
S.E. of regression	0.034057	Akaike info criterion	[illegible]
Sum squared resid	0.136865	Schwarz criterion	[illegible]
Log likelihood	236.3024	Hannan-Quinn criter.	-3.886172
F-statistic	529.4503	Durbin-Watson stat	[illegible]
Prob(F-statistic)	0.000000		

Table 5-6. Results of Regressions for Big Companies based upon Size-SCAPM

$$R_{pbt} = PI_t + B_j\,(R_m - PI_t) + \varepsilon$$

Dependent Variable: BIG_PI
Method: Least Squares
Sample: 1 120
Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.005628	0.003139	[illegible]	[illegible]
KSE_PI	0.813067	0.034758	[illegible]	[illegible]

R-squared	0.822622	Mean dependent var	[illegible]
Adjusted R-squared	0.821119	S.D. dependent var	[illegible]
S.E. of regression	0.034213	Akaike info criterion	[illegible]
Sum squared resid	0.138121	Schwarz criterion	[illegible]
Log likelihood	235.7542	Hannan-Quinn criter.	[illegible]
F-statistic	547.2468	Durbin-Watson stat	[illegible]
Prob(F-statistic)	0.000000		

In order to test SCAPM, on big companies' portfolio, we run another regression by replacing RFR with inflation and results are presented in Table (5-6). According to

results we found slight improvement in value of adjusted R Square, Beta coefficient of market and value of F statistics, while minor reduction in value of Durbin-Watson statistics. So again SCAPM with proxy of inflation performed better than CAPM.

After documenting evidence on big companies' portfolio, we tested impact of market index on returns of small companies (size based) portfolio by using CAPM as well as SCAPM and results are presented in Table (5-7 to 8). According to results in Table (5-7) value of adjusted R square is just 40% as opposed to 70% for whole sample and 81% for big companies, with reasonably good value of Durbin-Watson statistics. Beta coefficient of market is just 44% at 1% significance level depicting that market explains only 44% variation in cross section stock returns of small companies. Overall fitness of model is good as depicted by F statistics at 1% significance level.

Table 5-7. Results of Regressions for Small Companies based upon Size-CAPM

$$R_{pst} = RF_t + B_j\,(R_m - RF_t) + \varepsilon$$

Dependent Variable: SMAL_RF
Method: Least Squares
Sample: 1 120
Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001931	0.004339	[illegible]	0.6571
KSE_RF	0.442323	0.048746	[illegible]	0.0000

R-squared	0.411009	Mean dependent var	[illegible]
Adjusted R-squared	0.406017	S.D. dependent var	[illegible]
S.E. of regression	0.047333	Akaike info criterion	[illegible]
Sum squared resid	0.264367	Schwarz criterion	3.209241
Log likelihood	196.8019	Hannan-Quinn criter.	3.227832
F-statistic	82.34252	Durbin-Watson stat	[illegible]
Prob(F-statistic)	0.000000		

Results for SCAPM with inflation proxy instead of risk free rate are presented in Table (5-8). According to results, we found slightly better coefficient of market index, value of adjusted R square and value of F statistics, while a minor decrease in value of Durbin-Watson statistics, clearly inflation proxy is superior over risk free rate.

Table 5-8. Results of Regressions for Small Companies based upon Size-SCAPM

$$R_{pst} = PI_t + B_j (R_m - PI_t) + \varepsilon$$

Dependent Variable: SMAL_PI
Method: Least Squares
Sample: 1 120
Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002226	0.004426	0.503000	0.6159
KSE_PI	0.459476	0.048998	9.377254	0.0000

R-squared	0.426898	Mean dependent var	0.006355
Adjusted R-squared	0.422142	S.D. dependent var	0.063450
S.E. of regression	0.048233	Akaike info criterion	-3.269030
Sum squared resid	0.274519	Schwarz criterion	-3.189872
Log likelihood	194.5418	Hannan-Quinn criter.	-3.190983
F-statistic	87.93289	Durbin-Watson stat	1.714392
Prob(F-statistic)	0.000000		

As we discussed in previous section and presented in Table 5-2, that on the basis of size, small companies have outperformed big companies as for average returns of period under review is concerned, hence as per CAPM, beta coefficient of small companies' portfolio should be higher in order to match with actual/required returns by investors. However Beta coefficients of small companies are even lesser than sample and portfolio of big companies. This phenomenon raises question upon application of CAPM as a market equilibrium model. While beta is the only risk measure under CAPM and portfolios with high beta requires higher return and vice versa. However in case of small

companies' portfolio with lesser beta coefficient than big companies' portfolio, application of CAPM will mislead the investors. Certainly there are other factors which proxy for risk and investors in small companies must not rely on CAPM alone as pricing model.

After noticing the small firms' anomaly in CAPM, this research broken the sample into two portfolios based on median book to market value, as high B/M and low B/M portfolios for further analysis. Regression results of high B/M portfolio are presented in Table (5-9). As we have regressed the risk premium only, by deducting risk free rate from average portfolio returns as well as from market index returns, hence ideally intercept should be zero. Although negative intercept less than 1% per month emerged, however statistically insignificant.

Table 5-9. Results of Regressions for High B/M Portfolio-CAPM

$$R_{pht} = R_f + B_j (R_m - R_f) + \varepsilon$$

Dependent Variable: HIHG_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002859	0.004014	0.712269	0.4777
KSE_RF	0.629557	0.045085	13.96340	0.0000

R-squared	0.622975	Mean dependent var	0.000010
Adjusted R-squared	0.619780	S.D. dependent var	0.075000
S.E. of regression	0.043780	Akaike info criterion	-3.402274
Sum squared resid	0.226172	Schwarz criterion	-3.356984
Log likelihood	206.1645	Hannan-Quinn criter.	-3.383875
F-statistic	194.9767	Durbin-Watson stat	2.024513
Prob(F-statistic)	0.000000		

Value of adjusted R Square as well as Beta coefficient of the market index is 62%, explaining about 2/3rd of variations in stock returns. Over all fitness of model to data is good as depicted by F statistics at 1% significance level. Also Durbin-Watson statistics is good, hence results are reliable; however market Beta is less than Beta of sample average.

Table 5-10. Results of Regressions for High B/M Portfolio-SCAPM

$$R_{pht} = PI_t + B_j (R_m - PI_t) + \varepsilon$$

Dependent Variable: HIGH_PI
Method: Least Squares
Sample: 1 120
Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003051	0.004059	0.751684	0.4537
KSE_PI	0.641362	0.044942	14.27097	0.0000

R-squared	0.633154	Mean dependent var	0.008614
Adjusted R-squared	0.630045	S.D. dependent var	0.072733
S.E. of regression	0.044239	Akaike info criterion	-3.351896
Sum squared resid	0.230936	Schwarz criterion	-3.285438
Log likelihood	204.9138	Hannan-Quinn criter.	-3.324929
F-statistic	203.6605	Durbin-Watson stat	1.993595
Prob(F-statistic)	0.000000		

Likewise when we replaced intercept proxy of CAPM (RFR) with inflation (PI) as suggested by Hanif, (2011) in Shari'a Compliant Asset Pricing Model, study got slightly better results (Table 5-10), similar to size based, as explained earlier. Value of R square, beta coefficient of the market index and F statistics slightly improved, while Durbin-Watson statistics slightly decreased; once again SCAPM turned slightly better than traditional CAPM.

After documenting evidence on high B/M portfolio, we run OLS regression on low B/M companies' portfolio by using CAPM and SCAPM in parallel. Results of CAPM are presented in Table (5-11). According to results market index explains 61%

variation in stock returns of Shari'a compliant sample. Intercept is insignificant, in line with theory as we deducted risk free return from average sample returns as well as from market returns.

Table 5-11. Results of Regressions for Low B/M Portfolio-CAPM

$$R_{plt} = R_f + B_j\,(R_m - R_f) + \varepsilon$$

Dependent Variable: LOW_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.006629	0.003387	-1.957010	0.0527
KSE_RF	0.616116	0.038053	16.23845	0.0000

R-squared	0.690978	Mean dependent var	-0.001572
Adjusted R-squared	0.688359	S.D. dependent var	0.066191
S.E. of regression	0.036951	Akaike info criterion	-3.741920
Sum squared resid	0.161115	Schwarz criterion	-3.695462
Log likelihood	226.5152	Hannan-Quinn criter.	-3.723053
F-statistic	263.8497	Durbin-Watson stat	1.780839
Prob(F-statistic)	0.000000		

Table 5-12. Results of Regressions for Low B/M Portfolio-SCAPM

$$R_{plt} = PI_t + B_j\,(R_m - PI_t) + \varepsilon$$

Dependent Variable: LOW_PI
Method: Least Squares
Sample: 1 120
Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006425	0.003436	[illegible]	[illegible]
KSE_PI	0.629688	0.038066	[illegible]	0.0000

R-squared	0.698637	Mean dependent var	[illegible]
Adjusted R-squared	0.696083	S.D. dependent var	[illegible]
S.E. of regression	0.037470	Akaike info criterion	[illegible]
Sum squared resid	0.165676	Schwarz criterion	[illegible]
Log likelihood	224.8400	Hannan-Quinn criter.	[illegible]
F-statistic	273.5540	Durbin-Watson stat	[illegible]
Prob(F-statistic)	0.000000		

Adjusted R square is 69% with good value of Durbin-Watson statistics, hence results are reliable. Over all fitness of model is good as depicted by F statistics. To get the evidence on SCAPM, we run another OLS regression by replacing risk free rate with inflation and results are presented in Table (5-12). We got slightly better coefficient of market, value of adjusted R square and F statistics, while slight reduction in the value of Durbin-Watson statistics.

In case of low book to market portfolio of companies based on B/M ratio, results are almost matching with average returns of whole sample during period under review and market index explained variation up to 69%, however results for High B/M portfolio of companies are lesser than sample average, in fact up to 62%. High B/M portfolio of companies' returns depend only less than $2/3^{rd}$ of total variation, upon market index of KSE-100. As we discussed in previous section and presented in Table (5-2) that on the basis of B/M ratio, high book to market portfolio has outperformed low book to market portfolio (by an average of 1% monthly and 12% annually, approx) as for average returns of period under review is concerned, hence as per CAPM, beta coefficient of high B/M portfolio should be higher in order to match with actual/required returns by investors. However Beta coefficient of high B/M portfolio is not sufficient high to capture excess returns (over low B/M). This phenomenon raises question upon application of CAPM as a market equilibrium model. While beta is the only risk measure under CAPM and portfolios with high beta requires higher return and vice versa. However in case of high B/M portfolio beta coefficient (0.62) is not supporting the theory, hence, application of CAPM will mislead the investors. Certainly there are other factors which proxy for risk and investors in high B/M companies must not rely on CAPM alone, as pricing model.

After noticing the high book to market firms' anomaly in CAPM, we divided the sample into two portfolios based on median price earnings ratio, as high PER and low PER portfolios for further analysis. This study run the regression between market risk premium (Rm-Rf) as well as (Rm-Pi) and portfolio risk premium (Rpt High PER-Rf,), (Rpt Low PER-Rf) as well as (Rpt-High PER-PI,), (Rpt Low PER-PI) and results are presented in Table (5-13 to 16).

Table 5-13. Results of Regressions for High PER Portfolio-CAPM

$$R_{pht} = R_f + B_j (R_m - R_f) + \varepsilon$$

Dependent Variable: HIHG_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004648	0.003390	1.371083	0.1729
KSE_RF	0.587699	0.051660	11.37623	0.0000

R-squared	0.667703	Mean dependent var	0.000161
Adjusted R-squared	0.664887	S.D. dependent var	0.063021
S.E. of regression	0.037061	Akaike info criterion	-3.735865
Sum squared resid	0.162077	Schwarz criterion	-3.681067
Log likelihood	226.1679	Hannan-Quinn criter.	-3.713638
F-statistic	237.1042	Durbin-Watson stat	1.810285
Prob(F-statistic)	0.000000	Wald F-statistic	129.4106
Prob(Wald F-statistic)	0.000000		

As per results, market index explains above 58% variation in cross section stock returns for high PER Shari'a compliant sample during period under review at 1% significance level. Overall fitness of model is good as depicted by F statistics. Value of adjusted R square is 66%, very closer to sample, with good Durbin-Watson statistics. And results of SCAPM are slightly better than CAPM. Under SCAPM value of adjusted

R square is high (67%), F stat is better, beta coefficient is high, and Durbin-Watson slightly reduced.

Table 5-14. Results of Regressions for High PER Portfolio-SCAPM

$$R_{pht} = PI_t + B_j (R_m - PI_t) + \varepsilon$$

Dependent Variable: HIGH_PI
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004425	0.003471	1.274909	0.2048
KSE_PI	0.599618	0.054228	11.06100	0.0000

R-squared	0.675869	Mean dependent var	0.000985
Adjusted R-squared	0.673122	S.D. dependent var	0.065537
S.E. of regression	0.037641	Akaike info criterion	-3.704915
Sum squared resid	0.167186	Schwarz criterion	-3.655457
Log likelihood	224.2949	Hannan-Quinn criter.	-3.688848
F-statistic	246.0505	Durbin-Watson stat	1.998691
Prob(F-statistic)	0.000000	Wald F-statistic	122.3457
Prob(Wald F-statistic)	0.000000		

Regression results of low PER portfolio are presented as under. According to results market explained 65% of stock returns' variation of low PER companies. Value of adjusted R square is 63% with Durbin-Watson statistics above 2. Overall fitness of model to data is good as depicted by F statistics at 1% significance level. No problem of hetroskedasticity as depicted by probability of Wald F statistics. Results of SCAPM are slightly better than traditional CAPM with improved coefficient of market, value of F statistics and adjusted R square.

Table 5-15. Results of Regressions for Low PER Portfolio-CAPM

$$R_{plt} = R_f + B_j (R_m - R_f) + \varepsilon$$

Dependent Variable: LOW_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000961	0.004029	0.238543	0.8139
KSE_RF	0.658968	0.045679	14.42596	0.0000

R-squared	0.639507	Mean dependent var	0.006342
Adjusted R-squared	0.636452	S.D. dependent var	0.073259
S.E. of regression	0.044227	Akaike info criterion	-3.392451
Sum squared resid	0.230808	Schwarz criterion	-3.336884
Log likelihood	204.9471	Hannan-Quinn criter.	-3.369938
F-statistic	209.3293	Durbin-Watson stat	2.023497
Prob(F-statistic)	0.000000	Wald F-statistic	208.1694
Prob(Wald F-statistic)	0.000000		

Table 5-16. Results of Regressions for Low PER Portfolio-SCAPM

$$R_{plt} = PI_t + B_j (R_m - PI_t) + \varepsilon$$

Dependent Variable: LOW_PI
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001124	0.004063	0.276639	0.7826
KSE_PI	0.670171	0.047749	14.03534	0.0000

R-squared	0.649297	Mean dependent var	0.007747
Adjusted R-squared	0.646325	S.D. dependent var	0.074049
S.E. of regression	0.044632	Akaike info criterion	-3.384111
Sum squared resid	0.235059	Schwarz criterion	-3.328543
Log likelihood	203.8520	Hannan-Quinn criter.	-3.361597
F-statistic	218.4667	Durbin-Watson stat	2.035010
Prob(F-statistic)	0.000000	Wald F-statistic	196.9853
Prob(Wald F-statistic)	0.000000		

As we listed above in Table (5-2), returns of low PER portfolio have outperformed high PER, hence as per CAPM theory beta coefficient of low PER portfolio should be higher than high PER portfolios. Results are supporting theory; however whether beta is sufficiently high to compensate required return by investors is an interesting question as the difference with high PER is only 7% in Beta. Coefficient (Beta) of market is only explaining 65% which is less than sample average and also 35% variation left unexplained.

Table 5-17. Results of Regression for High CFY Portfolio-CAPM

$$R_{pht} = RF_t + B_j\,(R_m - RF_t) + \varepsilon$$

Dependent Variable: HCF_RFR
Method: Least Squares
Sample: 1 108
Included observations: 108
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.005606	0.003997	1.414964	0.1600
KSE_RFR	0.527583	0.053630	10.70968	0.0000

R-squared	0.615960	Mean dependent var	0.012509
Adjusted R-squared	0.612337	S.D. dependent var	0.065421
S.E. of regression	0.040733	Akaike info criterion	-3.542029
Sum squared resid	0.175871	Schwarz criterion	-3.492654
Log likelihood	193.4421	Hannan-Quinn criter.	-3.522034
F-statistic	170.0132	Durbin-Watson stat	2.204014
Prob(F-statistic)	0.000000	Wald F-statistic	114.6004
Prob(Wald F-statistic)	0.000000		

Results of regression based on CFY division are presented in Tables (5-17 to 20). Overall variation explained by market index is 57%, and 67% for HCFY & LCFY, and results of SCAPM are slightly better than CAPM. However coefficient of HCFY is lesser than LCFY, which are not matching with theory, hence it is an anomaly in CAPM model.

Intercept of LCFY is significant surprisingly, and in all other cases, it remained insignificant.

Table 5-18. Results of Regression for High CFY Portfolio-SCAPM

$$R_{pht} = PI_t + B_j\,(R_m - PI_t) + \varepsilon$$

Dependent Variable: HCF_PI
Method: Least Squares
Sample: 1 108
Included observations: 108
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.005615	0.004104	1.368421	0.1741
KSE_PI	0.590925	0.057401	10.29475	0.0000

R-squared	0.626982	Mean dependent var	0.012904
Adjusted R-squared	0.623463	S.D. dependent var	0.067336
S.E. of regression	0.041319	Akaike info criterion	3.516628
Sum squared resid	0.180972	Schwarz criterion	3.466959
Log likelihood	191.8979	Hannan-Quinn criter.	3.496489
F-statistic	178.1689	Durbin-Watson stat	1.991182
Prob(F-statistic)	0.000000	Wald F-statistic	105.9619
Prob(Wald F-statistic)	0.000000		

Table 5-19. Results of Regressions for Low CFY Portfolio-CAPM

$$R_{plt} = RF_t + B_j\,(R_m - RF_t) + \varepsilon$$

Dependent Variable: LOW_RFR
Method: Least Squares
Sample: 1 108
Included observations: 108
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.009515	0.003935	2.417859	0.0173
KSE_RFR	0.678300	0.048927	13.86338	0.0000

R-squared	0.692284	Mean dependent var	0.001649
Adjusted R-squared	0.689320	S.D. dependent var	[illegible]
S.E. of regression	0.040395	Akaike info criterion	[illegible]
Sum squared resid	0.172970	Schwarz criterion	[illegible]
Log likelihood	194.3401	Hannan-Quinn criter.	[illegible]
F-statistic	238.4060	Durbin-Watson stat	[illegible]
Prob(F-statistic)	0.000000	Wald F-statistic	192.1892
Prob(Wald F-statistic)	0.000000		

Table 5-20. Results of Regressions for Low CFY Portfolio-SCAPM

$$R_{plt} = PI_t + B_j\,(R_m - PI_t) + \varepsilon$$

Dependent Variable: LCF_PI
Method: Least Squares
Sample: 1 108
Included observations: 108
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.009549	0.003985	-2.396551	0.0183
KSE_PI	0.688765	0.051029	13.49746	0.0000

R-squared	0.701204	Mean dependent var	-0.001056
Adjusted R-squared	0.698385	S.D. dependent var	0.074215
S.E. of regression	0.040769	Akaike info criterion	-3.543952
Sum squared resid	0.176094	Schwarz criterion	-3.494283
Log likelihood	193.3734	Hannan-Quinn criter.	-3.523813
F-statistic	248.7568	Durbin-Watson stat	1.633316
Prob(F-statistic)	0.000000	Wald F-statistic	182.1815
Prob(Wald F-statistic)	0.000000		

To summarize, this study tested the capital asset pricing model (CAPM) and Shari'a compliant asset pricing model (SCAPM) by dividing sample on the basis of Size, Book to Market (B/M), Price to Earnings Ratio (PER) and Cash Flow Yield (CFY) on a special sample of Shari'a compliant securities, listed on Karachi Stock Exchange during period of 2001-10. We found slightly better results for SCAPM than CAPM, however negligible, hence it is concluded that [for calculation purposes and not theoretically] risk free rate and inflation index have same meaning as for CAPM equation is concerned, during study period, for Shari'a compliant securities. Based on monthly price observations, Market index has explained about 70% variation in stock returns of sample during study period and confirms long run relationship between market index and stock returns. Evidence suggests market index as a strong proxy for risk. It is further

documented that on the basis of size, CFY and book to market portfolios, theory of CAPM could not support realized (required) returns by investors and beta coefficients were not sufficient to compensate excess returns of small companies and high B/M Companies. In case of low PER portfolio although beta coefficient was higher than high PER and supporting theory of CAPM, however relationship with market index is only 65% and balance variation left unaddressed. As this study used risk premium only in regression models, hence expected intercept was zero, however we got some intercept values, but statistically insignificant, except LCFY. It is documented on the basis of evidence that CAPM has its prime place for Shari'a compliant index on Karachi stock exchange, however as the explanatory power is only up to 70%, hence, there are other risk factors, needed to be identified including Size, B/M, CFY and PER. Future research agenda includes working on these and other factors which could be used as proxy for risk. Based on evidence we cannot reject Hypothesis one including sub hypothesis.

In order to check whether these are sample specific results or generalize-able, this study calculated correlation between returns of Shari'a compliant sample and KSE-100 index during period under review, based on 120 monthly observations and found very strong long run correlation of 84%, hence; these results represent Karachi Stock Market.

CHAPTER 6
MACROECONOMIC FACTORS

This Chapter of analysis is dedicated to macroeconomic factors and includes descriptive statistics, trends in log series, Testing for unit root through Augmented Dickey Fuller (ADF) test & Phillips-Perron (PP) test, , Multicolinearity, Johansen cointegration anlaysis for capturing long run relationship and finally regression analysis.

Following the collection of data of all (ten) macroeconomic variables and stock prices, differences in time series were reduced through natural log. Before proceeding to test formal relationship, and impact of theoretically selected independent variables through regression equation, certain tests on time series were applied to test the suitability of the data for analysis. Following techniques were used in analyzing the data.

Descriptive statistics and correlation: this is used to study basic features of our variables; such as mean, median, standard deviation, coefficient of variation etc., in order to have basic feel about data including skewness and Jarque-Bera (normality) and their cross correlations whether any of the regressor variables is to be deleted. Because if there is strong correlation between two independent variables one of them must be dropped to avoid impact of multicolinearity in the regression model.

Co-integration test: In order to check whether the variables in our model have long run equilibrium relationship, we apply Johansen-Juselius [JJ] (1990) cointegration test.

Cointegration is a requirement for any economic model which involves non stationery time series data because if the variables do not cointegrate then the model may suffer from spurious regression problem. In the words of Granger "A test of co-integration can be thought of as a pretest to avoid 'spurious regression' situations"[18].

Test of Stationery: As the cointegration is based on the order of integration of variables, therefore we apply the formal Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test to check the order of integration of our variables. These tests also provide a formal procedure to check for non-stationerity or the existence of unit root process.

Regression analysis: After finalizing the above tests we obtained long run parameters of our model using standard OLS technique.

6.1. Descriptive Statistics and Trends

Descriptive statistics is provided in table 6-1 while Figure 6-1 shows trends in log time series including stocks and macroeconomic variables. Highest monthly average was found in money supply while least average change taken place in foreign direct investment. Average can misguide due to outliers, hence we calculated median of log series and results are almost same, hence we can say average is well representative of population. Much variation is found in FDI as disclosed by maximum and minimum value which is confirmed by coefficient of variation. Kortises and Jarque Bera statistics are also not closer to standard, which is expected in time series.

[18] For details please see Gujrati & Porter, 2009, page 762.

Figure 6-1. Trends in Log-Macroeconomic Series

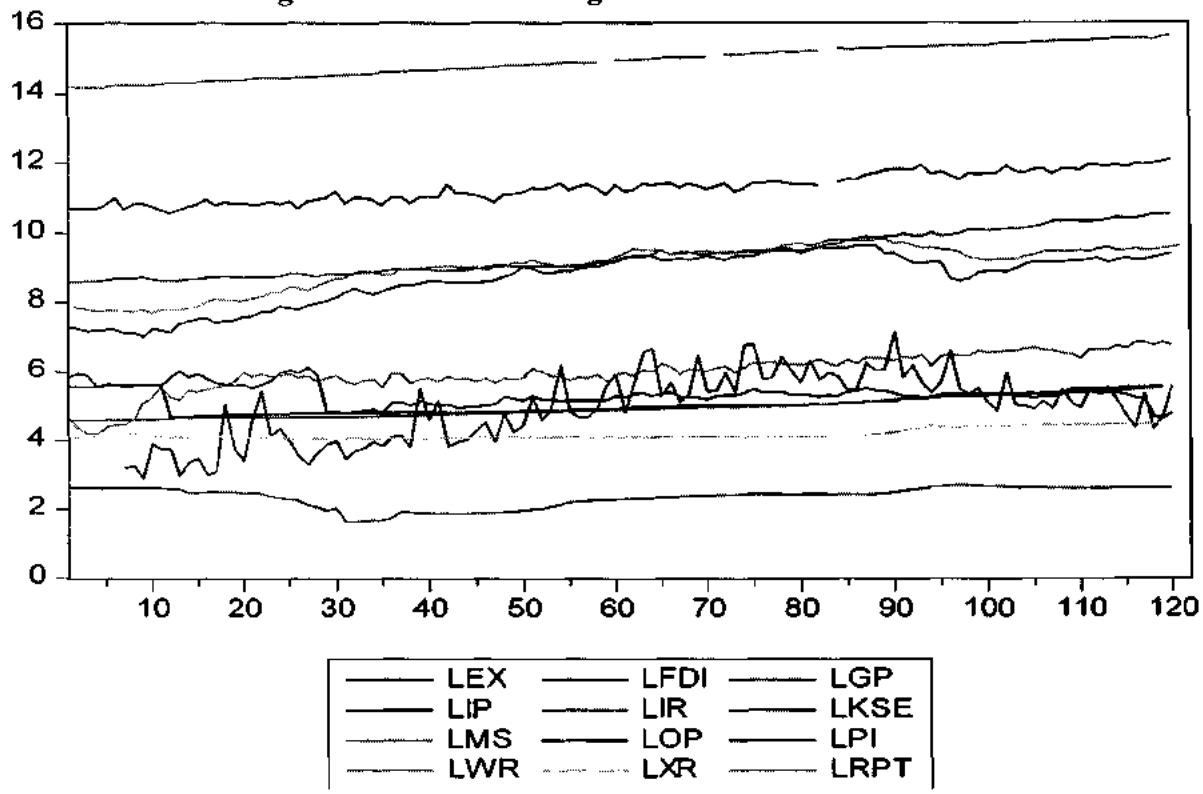


Table 6-1. Descriptive Statistics Log-series of Stocks and Macroeconomic Variables

	LEX	LFDI	LGP	LIP	LIR	LKSE	LMS	LOP	LPI	LWR	LXR	LRPT
Mean	11.32	4.90	9.39	5.32	2.33	8.72	14.96	5.05	4.95	6.05	4.18	9.06
Median	11.35	4.96	9.29	5.29	2.42	8.95	14.99	5.00	4.89	5.98	4.10	9.23
Maximum	12.03	7.14	10.54	6.13	2.69	9.62	15.61	5.62	5.50	6.84	4.46	9.81
Minimum	10.59	2.91	8.62	4.62	1.63	7.03	14.24	4.69	4.59	4.44	4.05	7.70
Std. Dev.	0.38	1.00	0.59	0.29	0.29	0.71	0.41	0.28	0.27	0.45	0.14	0.59
Skewness	0.06	(0.04)	0.44	0.46	(0.87)	(0.87)	(0.14)	0.66	0.51	(0.63)	1.02	(0.96)
Kurtosis	1.86	2.20	1.82	3.68	2.59	2.60	1.72	2.10	1.93	4.17	2.27	2.80
Cef. Var	0.03	0.20	0.06	0.05	0.13	0.08	0.03	0.06	0.05	0.07	0.03	0.06
Jarque-Bera	5.98	2.95	9.82	6.01	14.71	14.51	7.87	11.66	9.99	13.69	21.59	17.10
Probability	0.05	0.23	0.01	0.05	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00
Sum	1,245	538	1,032	585	256	959	1,645	555	544	665	459	996
Sum Sq. Dev.	16.12	108.53	37.79	9.17	9.42	54.55	18.34	8.54	7.95	21.76	2.27	37.72
Observations	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00

6.2. Co-integration Test

Cointegration is used to capture genuine long run relationship among stationary variables which although rise over time yet there is a common trend that links them together. The requirement of a long run relationship between Y and X is that there should be a linear combination of y_t *and* x_t that is stationery. In order to run cointegration test, stationerity of series is required on same order, hence before running the test we have checked stationery through standard unit root tests and results are presented in Table (6-4). The widely used approach to test co-integration is Johansen-Juselius [JJ] (1990). In order to check the long term relationship among the variables, JJ co integration approach was applied. The VECM (Vector Error Correction Model) takes the following general form[19]:

$$\Delta Y_t = \sum_{j=1}^{k-1} \beth_j \Delta Y_{t-j} + \propto \beta' Y_{t-k} + \mu + \varepsilon_t$$

Where Δ is a first difference notation, Y_t is a P*1 vector integrated of order one, μ is a P*1 Constant vector representing a linear trend in a system, K is a lag structure, and ε_t is a p*1 Gaussian white noise residual vector. $\beth_j$ is a P*P matrix and indicates short term adjustments among variables across P equations at the *j*th lag. Two matrics $\alpha$and β are of dimension P * r where αdenotes the speed of adjustment (loading) and βrepresents the co-integrating vectors.

To determine the number of co-integrated vectors, they propose two likelihood ratio tests: one is the maximal Eigen value test which evaluates the null hypothesis that there are at most *r* co-integrating vectors against the alternative of *r* +1 co-integrating vectors. The value of maximum Eigen statistic is measured by: $\lambda max = - T\, ln\, (1 - \lambda r+1)$

[19] For details see Mukharjee & Naka (1995).

where λ r+1,…,λn are the n-r smallest squared canonical correlations and T = the number of observations. Another test is based on *trace* statistic which tests the null hypothesis of *r* co-integrating vectors against the alternative of *r* or more co-integrating vectors using statistic:[20] $\lambda\ trace = -T \Sigma\ ln\ (1 - \lambda i)$.

Table 6-2 Summary Results of Cointegration Equations/Models

Sample: 1 122 Included observations: 94 Lags Interval: 1 to 3
Series: EX FDI GP IP IR KSE_INDEX MS OP PI RRT_DS WR XR
Selected (0.05 level*) Number of Cointegrating Relations by Model

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	7	9	8	8	6
Max-Eig	6	6	7	6	4

*Critical values based on MacKinnon-Haug-Michelis (1999)

Information Criteria by Rank and Model

Data Trend:	None	None	Linear	Linear	Quadratic
Rank or No. of CEs	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
	Log Likelihood by Rank (rows) and Model (columns)				
0	-6278.196	-6278.196	-6266.389	-6266.389	-6261.255
1	-6216.289	-6210.299	-6199.224	-6198.733	-6177.147
2	-6171.216	-6159.512	-6151.596	-6149.064	-6131.010
3	-6133.353	-6120.970	-6114.360	-6106.053	-6092.362
4	-6102.211	-6085.666	-6079.132	-6070.787	-6063.088
5	-6073.557	-6054.536	-6048.046	-6039.468	-6026.743
6	-6048.291	-6027.726	-6021.655	-6013.064	-6009.466
7	-6032.987	-6007.393	-6001.495	-5992.280	-5990.051
8	-6019.834	-5992.516	-5986.832	-5973.565	-5969.840
9	-6009.191	-5979.612	-5975.579	-5962.214	-5958.977
10	-6005.296	-5969.960	-5967.008	-5953.375	-5946.130
11	-6003.586	-5965.270	-5963.210	-5947.935	-5940.920
12	-6003.461	-5964.101	-5964.101	-5946.749	-5940.749

[20] For details see Hasan, et.al (2008)

Akaike Information Criteria by Rank (rows) and Model (columns)

0	142.7701	142.7701	142.7742	142.7742	142.6586
1	141.9636	141.8574	141.8558	141.8667	141.6414
2	141.5152	141.3088	141.3531	141.3418	141.1704
3	141.2203	141.0206	141.0700	140.9586	140.7735
4	141.0683	140.8014	140.8926	140.7401	140.5338
5	140.9693	140.6710	140.6818	140.6057	140.3620
6	140.9424	140.6325	140.6309	140.5758	140.4140
7	141.1274	140.7318	140.7127	140.6655	140.5138
8	141.3582	140.9471	140.9113	140.7993	140.6776
9	141.6424	141.2046	141.1825	141.0897	140.9781
10	142.0701	141.5119	141.5278	141.4335	141.3646
11	142.5444	141.9632	141.9619	141.8497	141.8494
12	143.0524	142.4702	142.4702	142.3564	142.3564

Schwarz Criteria by Rank (rows) and Model (columns)

0	154.4585	154.4585	154.7872	154.7872	154.6663
1	154.3013	154.2222	154.5182	154.5561	154.4265
2	154.5023	154.3499	154.6648	154.7076	154.5861
3	154.8567	154.7382	155.0311	155.0008	154.9192
4	155.3541	155.1954	155.4430	155.4588	155.4689
5	155.9044	155.7413	155.9415	156.0007	155.9464
6	156.5268	156.3792	156.5401	156.6473	156.5978
7	157.3612	157.1550	157.2711	157.4134	157.3969
8	158.2413	158.0467	158.1191	158.2235	158.2100
9	159.1749	158.9805	159.0397	159.1903	159.1679
10	160.2520	159.9643	160.0344	160.2106	160.1868
11	161.3756	161.0920	161.1178	161.3032	161.3300
12	162.5329	162.2755	162.2755	162.4863	162.4863

An important issue in checking the cointegration of time series is the selection of appropriate lags length. We estimated VAR model by including all our variables at level and determined appropriate lags through Akaike Information Criteria (AIC) and Shawarz Criteria (SBC). In order to choose appropriate cointegration model, we used the EViws-8 summary option (6) which summarize all five sets of assumptions for deterministic trends and results are presented as under (Table 6-2). Based on Akaike Information Criteria (AIC) and Shawarz Criteria (SBC), we selected model-4 [linear intercept and trends] for

checking multivariate cointegration among underlying time series, for the period under review, and results are presented in Table (6-3).

Table 6-3 Results of JJ Cointegration Test

Sample (adjusted): 11 119; Included observations: 94 after adjustments
Trend assumption: Linear deterministic trend (restricted)
Series: RPT_DS EX FDI GP IP IR KSE_INDEX MS OP PI WR XR
Lags interval (in first differences): 1 to 3

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.762949	639.2794	374.9016	[illegible]
At most 1 *	0.652428	503.9684	322.0692	[illegible]
At most 2 *	0.599539	404.6307	273.1889	[illegible]
At most 3 *	0.527794	318.6077	228.2979	[illegible]
At most 4 *	0.486426	248.0757	187.4201	[illegible]
At most 5 *	0.429810	185.4377	150.5585	[illegible]
At most 6 *	0.357390	132.6298	117.7082	[illegible]
At most 7 *	0.328461	91.06131	88.80380	0.0340
At most 8	0.214561	53.63202	63.87610	[illegible]
At most 9	0.171443	30.92988	42.91525	[illegible]
At most 10	0.109297	13.25130	25.87211	0.7184
At most 11	0.024911	2.371305	12.51798	[illegible]

Trace test indicates 8 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.762949	135.3110	[illegible]	[illegible]
At most 1 *	0.652428	99.33765	[illegible]	[illegible]
At most 2 *	0.599539	86.02304	68.81206	[illegible]
At most 3 *	0.527794	70.53199	62.75215	[illegible]
At most 4 *	0.486426	62.63801	56.70519	[illegible]
At most 5 *	0.429810	52.80786	50.59985	0.0290
At most 6	0.357090	41.56849	44.49720	[illegible]
At most 7	0.328461	37.42929	38.33101	[illegible]
At most 8	0.214561	22.70214	32.11832	[illegible]
At most 9	0.171443	17.67858	25.82321	[illegible]
At most 10	0.109297	10.88000	19.38704	[illegible]
At most 11	0.024911	2.371305	12.51798	[illegible]

Max-eigenvalue test indicates 6 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values

According to results long term relationships exist among time series. Trace statistics indicate 8 cointegrating equations at the 0.05 significant level, while maximum Eigen statistics show 6 cointegrating models. Further analysis of unidirectional/bidirectional relationships among long term macroeconomic series is conducted by Bivariate analysis and Granger Causality test, which is beyond the scope of this study, hence we move to regression analysis, keeping in view the study objectives i.e. whether macroeconomic variables explain variations in cross section stock returns of Shari'a compliant sample in domestic market.

6.3. Stationery Test

In order to test the impact of independent variables on dependent variable, stationery check is essential as regression application on non-stationary data could give misleading results. In order to check stationerity of data, ADF and PP tests are applied through application of EViews-8. ADF test's general specification is given below:

$$\Delta Y_t = (\propto -1)Y_{t-1} + \beta_i \sum_{i=1}^{p} \Delta Y_{t-i} + u_i$$

Or $$\Delta Y_t = \emptyset Y_{t-1} + \beta_i \sum_{i=1}^{p} \Delta Y_{t-i} + u_i$$

Where Y_t in the variable in question to be tested for stationarity. As per the theory, the null is: Ho: $\emptyset = 0$ and alternative is Ha: $\emptyset < 0$. For the series to be stationary, the null hypothesis should be rejected. The results of each series both at level as well as at first difference are presented in Table (6-4).

Table 6-4 Unit Root Tests

Null Hypothesis: D(EX) has a unit root.

Description	Augmented Dickey-Fuller Test		Phillips-Perron Test	
	At Level	At 1st Diff	At Level	At 1st Diff
	t-Statistics Prob.*	t-Statistics Prob.*	t-Statistics Prob.*	t-Statistics Prob.*
Export	0.694655 0.9916	-11.6815 0.0000	0.239059 0.9740	-18.50259 0.0000
Foreign Direct Investment	-1.65876 0.4492	-9.31881 0.0000	-6.459137 0.0000	-35.69466 0.0001
Gold Prices	3.252047 1.0000	-9.37228 0.0000	5.075854 1.0000	-9.314895 0.0000
Industrial Production	-1.47597 0.5418	-9.58041 0.0000	-2.779753 0.0642	-9.550885 0.0000
Oil Prices	-1.60079 0.479	-10.2345 0.0000	-1.683420 0.4370	-10.23449 0.0000
Inflation	-1.35731 0.6009	-7.45623 0.0000	-1.389551 0.5853	-10.71438 0.0000
Worker's Remittances	-0.35588 0.9118	-11.7522 0.0000	-0.559958 0.8740	-21.78765 0.0000
Exchange Rate	0.01059 0.957	-4.47725 0.0004	0.501385 0.9862	-7.831966 0.0000
Interest Rate	-1.8632 0.3486	-2.799 0.0615	-1.268132 0.6427	-9.585339 0.0000
Money Supply	-.808492 0.9607	-8.758144 0.0000	7.335973 1.0000	-12.91386 0.0000
KSE-100 Index	-1.109682 0.7105	-9.463223 0.0000	-1.183998 0.6798	-9.442021 0.0000
Sample Returns	-1.87429 0.3434	-12.69 0.0000	-1.827557 0.3657	-12.63481 0.0000
Test Critical Values	1% Level 5% Level 10% Level	-3.48912 -2.88719 -2.58053		

*MacKinnon (1996) one-sided p-values

Table 6-4 presents results of ADF and PP for eleven independent variables including export, foreign direct investment, gold prices, industrial production, oil prices, inflation, workers' remittances, exchange rate, money supply, interest rate and KSE-100 Index. At level in all variables we found unit root, which disappeared at first difference.

At 1% confidence level critical value is -3.48912 and values appeared for all variables are less than critical value with probability of 0.0000 except for interest rate which is stationery at about 6%. Also unit root is tested for equally weighted Shari'a compliant stock prices and we found unit root at level which is disappeared at first difference. Results of stationery test signal the readiness for cointegration at level and regression analysis at first difference.

6.4. Multi-co linearity

In order to test the formal relationship between dependent and independent variables, it is required to handle the issue of multicolinearity. To address the issue we calculated a correlation matrix among log series of independent variables by application of EViews 8, and results are reported in Table (6-5). This table consists of two parts. Part one presents initial results and part two shows multicolinearity among those variables which are selected for regression model. As per results highest correlation (99%) is between inflation and gold prices, followed by money supply and gold prices (97%). Exports crossed 80% bench mark of multicolinearity with four other variables including gold prices, money supply, inflation and workers' remittances. Likewise, gold prices shown multicolinearity beyond tolerance level with four other variables including money supply, inflation, workers' remittances and exchange rate. Money supply crossed tolerance limit of multicolinearity with two variables including workers' remittances and inflation. Also inflation has multicolinearity beyond tolerance level with workers' remittances and exchange rate. So we excluded four variables from regression analysis on account of higher multicolinearity including exports, gold prices, money supply and inflation.

Table 6-5. Correlation Matrix Macroeconomic series

Part-I

	LEX	LFDI	LGP	LIP	LKSE	LMS	LOP	LPI	LWR	LXR	IR
LEX	1.00										
LFDI	0.64	1.00									
LGP	0.95	0.57	1.00								
LIP	(0.31)	(0.15)	(0.23)	1.00							
LKSE	0.78	0.79	0.71	(0.43)	1.00						
LMS	0.96	0.70	0.97	(0.31)	0.85	1.00					
LOP	0.64	0.23	0.73	(0.08)	0.26	0.61	1.00				
LPI	0.95	0.55	0.99	(0.24)	0.69	0.96	0.72	1.00			
LWR	0.89	0.60	0.89	(0.25)	0.74	0.91	0.46	0.89	1.00		
LXR	0.80	0.26	0.89	(0.11)	0.34	0.77	0.83	0.91	0.72	1.00	
IR	0.49	0.27	0.59	0.40	0.07	0.47	0.72	0.60	0.39	0.71	1.00

Part-II

	LFDI	LIP	LKSE	LOP	LWR	LXR	IR
LFDI	1.00						
LIP	(0.15)	1.00					
LKSE	0.79	(0.43)	1.00				
LOP	0.23	(0.08)	0.26	1.00			
LWR	0.60	(0.25)	0.74	0.46	1.00		
LXR	0.26	(0.11)	0.34	0.83	0.72	1.00	
IR	0.27	0.40	0.07	0.72	0.39	0.71	1.00

Logs of series were taken and abbreviations denote as under
XR = Exchange rate; PI = Inflation (price index); IR = Interest rate; IP = Industrial production; FDI = Foreign direct investment; WR = Remittances of expatriates; MS = Money supply; OP = Oil prices; GP = Gold prices; EX = Exports and KSE = Karachi Stock Exchange 100 Index.

We left with seven regressors including foreign firect investment, industrial production index, KSE 100 index, oil prices, workers's remittances, exchange rate and interest rate, which are presented in part two of Table (6-5).

6.5. Regression Analysis

In order to document the impact of macroeconomic series on cross section stock returns of Shari'a compliant sample, we have used equation (1) of cointegration (see appendix), which signifies the long term relationship among macroeconomic series and sample. We used general to specific approach in order to document the impact of macroeconomic variables on returns of underlying sample. First we eliminated four variables including exports, money supply, gold prices and inflation on account of multicolinearity. Then we calculated log of series to convert them into stationery, as depicted in Table (6-4). Now series are integrated at same order I(1) and we are ready to run the OLS regression. We started with seven variables and results are presented in Table (6-6). Then we kept on reducing the number of variables based upon P values and finally we got the relevant regressors, presented in Table (6-7).

According to Table 6-6, although adjusted R square is very high (96%), however given the Durbin-Watson statistics is low than value of R square, hence results are not reliable. As for impact of independent variables on dependent is concerned industrial production, oil prices and workers's remittances turned insignificant. Fitness of model to data is ok as depicted by F statistics at 1% significance level.

Table 6-6. Results of Initial Regression Analysis-Macroeconomics

Dependent Variable: LRPT; Method: Least Squares
Sample (adjusted): 7 119; Included observations: 113 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.018592	0.752412	1.353769	0.1787
IR	-0.019171	0.008763	-2.187826	0.0309
LFDI	0.057464	0.019261	2.983451	0.0036
LIP	-0.077639	0.054307	-1.429651	0.1556
LKSE	0.665221	0.033112	20.08975	0.0000
LOP	0.032699	0.078471	0.416697	0.6778
LWR	0.091531	0.054839	1.669094	0.0981
LXR	0.446186	0.208993	2.134937	0.0351

R-squared	0.969874	Mean dependent var	9.074269
Adjusted R-squared	0.967866	S.D. dependent var	0.585509
S.E. of regression	0.104958	Akaike info criterion	-1.602342
Sum squared resid	1.156705	Schwarz criterion	-1.408253
Log likelihood	98.53233	Hannan-Quinn criter.	-1.523989
F-statistic	482.9139	Durbin-Watson stat	0.948825
Prob(F-statistic)	0.000000		

After documenting initial regression results, we started eliminating insignificant variables [based on P value] and through different regression analysis, we finally selected four important macroeconomic variables as regressors for Shari'a compliant stock returns, in domestic market, during period under review, including foreign direct investment, interest rate, KSE-100 index and exchange rate and results are presented in Table (6-7). As per results collectively four macroeconomic variables explain variation in cross section stock returns up to 0.96, with Durbin-Watson statistics of 1.026, hence results are reliable. As a rule of thumb given by Granger and Newbold (1974), If R2 > DW-statistic or if R2 ~ 1 then the regression 'must' be spurious[21]. Over all fitness of model to data is good as given by value of F Statistics at 1% significance level. We also applied White-test for heteroskedastidity and found no issue in our model as depicted by P values of

[21] Applied Econometrics, revised edition 2007, Asteriou, D., & Hall, S.G., Page 293, PALGRAVE MACMILLAN Houndmills, Basingstoke, Hampshire RG21 6XS and 175 Fifth Avenue, New York, N.Y. 10010

Wald F statistics. All regressors including Foreign direct investment, interest rate, KSE-100 index and exchange rate are siginificant at 1% level. Interest rate's coefficient is emerged with negative signs, while FDI, KSE and exchange rate showed positive relation with stock returns. KSE index is the major predictor, followed by exchange rate and just 6% variation is explained by FDI. Interest rate explains about a quarter of stock variations, however with negative signs. So the pricing equation as follow:

$$R_t - R_f = 0.70KSE + 0.69XR + 0.06FDI - 0.24IR + \varepsilon$$

Table 6-7. Results of Final Regression Analysis-Macroeconomics

Dependent Variable: LRPT; Method: Least Squares
Sample (adjusted): 7 120; Included observations: 114 after adjustments
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.299016	0.295145	1.013116	0.3132
LFDI	0.064455	0.025142	2.563614	0.0117
LIR	-0.246498	0.051212	-4.813325	0.0000
LKSE	0.703060	0.034806	20.19929	0.0000
LXR	0.692708	0.116353	5.955517	0.0000

R-squared	0.969309	Mean dependent var	9.078580
Adjusted R-squared	0.968182	S.D. dependent var	0.584736
S.E. of regression	0.104302	Akaike info criterion	-1.661075
Sum squared resid	1.185811	Schwarz criterion	-1.520167
Log likelihood	98.48099	Hannan-Quinn criter.	-1.603970
F-statistic	860.6165	Durbin-Watson stat	1.926449
Prob(F-statistic)	0.000000	Wald F-statistic	1031.426
Prob(Wald F-statistic)	0.000000		

To summarize, in this study we have found that 96% of stock price variation is being explained by macroeconomic variables with two from financial sector (XR and IR) and two from real sector (FDI & KSE). KSE index is the most important variable in pricing stock returns of Shari'a compliant sample during period under review; hence investors should have an eye on the movement of KSE 100 index in their choice of

portfolio. The second important variable is the exchange rate movement and depreciation in local currency leads to higher demand of stock returns by investors. Increase in exchange rate leads to more revenue by firms engaged in exports which is being priced by stock market. A positive sign of exchange rate coefficient signifies that any depreciation in locl currency leads to higher stock returns' demand by investors. As expected; interest rate has negative correlation with stock returns because any increase in interest rate leads to diverting of investment from risky avenues to risk free opportunities. And finally FDI has shown positive impact on stock returns, as more FDI leads to overall more economic activities and more profits for firms which are being priced at stock exchange.

Results of this study (Shari'a compliant sample) are not very different from other studies conducted on KSE, using stock market returns, irrespective of their Shari'a compliant status (e.g. Butt & Rehman, 2010; Hasan & Javed, 2009; Mohammad, et. al, 2009; Qayyum & Kemal, 2006; Azam, 2011;), possibly due to following reasons. First; Islamic financial industry uses KIBOR (Karachi Inter Bank Offered Rate) as bench mark rate, for determining profit rate, in pricing assets due to competition with conventional banking industry; in the absence of its own bench mark for profit, hence, it offers a link between conventional financial sector and Islamic financial industry. Second; Share trading of Shari'a compliant companies is not limited to Islamic financial industry rather it is open to every investor. In fact Islamic financial industry with a market share of about 10% is not in a position to dominate and set prices, rather works as a price taker in domestic market. Furthermore only small amounts of funds are invested by Islamic

Financial Institutions in stock market given the risky nature of its operations, however Shari'a compliant equity funds are emerging in local market.

Based on results, we cannot reject second hypothesis of the study, and we suggest certain policy recommendations to policy makers and regulators as under. Transparency in KSE index is utmost required being leading indicator of economy. Furthermore interest rate should be reduced to let the economy flourish. FDI must be encouraged and more facilities should be provided to foreign investors and finally exchange rate should be controlled given the trade deficit on international trade account.

CHAPTER 7

MICROECONOMIC FACTORS

This chapter is dedicated for capturing the impact of Fama & French (FF) three factors model and extended Fama & French multiple factors model. This chapter starts with simple FF three factors and we kept on adding factors including PER, CFY and momentum till we got a pricing equation. Multicolinarity and regression analysis remained the econometric techniques throughout our analysis.

In this study's sample about 71% companies having closing in June and 20% companies were closing in December, while 7% and 2% in September and March respectively. First month of analysis is January which means 80% companies have data available, while our assumption about 20% companies closing in December is that summary figures were started to reach in the market in first following month. Nevertheless as for 80% companies are concerned detailed accounting data in the form of annual reports was well before hand available to investors (as at average holding of AGM was taken 107 days after closing in 2009). This study started analysis with the gap of six months for 73% companies and in fourth month or longer for 80% companies.

7.1. Fama-French Three Factors Model

As an initial step in the analysis, this research applied a well-tested and debated model of Fama and French (1992). As per the FF Model, we sorted sample returns every year on the basis of size, measured through previous year's (December) market value of equity of the companies in order. On the basis of median size of companies, the sample was divided into two portfolios as big and small. Simultaneously, this research ranked the companies returns on the basis of book to market equity of previous year (December) and divided sample into three parts through 30^{th} and 70^{th} Percentile. We classified top 30% as high B/M, Middle 40% as Middle B/M and small 40% as low B/M. Consequently we created six portfolios S/H, B/H, S/M, B/M, S/L and B/L, through the intersection of size and B/M divisions (2*3=6); hence S/H is a portfolio that contains all companies which are common in small (size based) and High (B/M based) divisions, and so on.

7.1.1. Yearly Number of Companies

Table 7-1 presents the number of companies included in each portfolio across the sample period. Number of companies has increased over sample period from 78 to 97, a difference of 19, leading to an average annual increase of two companies. However one can notice that the number of companies in S/H is more than double than B/H throughout the period under review, likewise the case is reverse under S/L and B/L distribution of companies; where B/L is dominating across the analysis period.

Table 7-1. Number of Companies selected in portfolios across 2001-10

Description	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
S/H	16	16	19	19	21	23	21	23	20	22	20
B/H	07	08	06	08	06	05	07	05	08	07	07
S/M	14	14	14	16	15	16	18	14	17	20	16
B/M	17	18	20	18	20	20	19	23	21	19	20
S/L	08	10	08	09	08	08	08	10	12	05	08
B/L	16	14	18	18	19	20	20	18	17	24	18
Total	78	80	85	88	89	92	93	93	95	97	80

S/H is a portfolio of small companies based on size with high book to market ratio
B/H is a portfolio of big companies based on size with high book to market ratio
S/M is a portfolio of small companies based on size with medium book to market ratio
B/M is a portfolio of big companies based on size with medium book to market ratio
S/L is a portfolio of small companies based on size with low book to market ratio
B/L is a portfolio of big companies based on size with low book to market ratio

7.1.2. Multi-co linearity

This study used three independent variables including (1) RM; Market risk premium measured as monthly average return on market index less monthly risk free return, (2) SMB; risk premium of small companies measured as difference of [two averages including] small stocks average return minus big stocks average return and (3) HML; risk premium of high book to market companies measured as difference between average returns of high B/M minus low B/M companies. We calculated the correlation among independent variables in order to check multi-co linearity and the results are presented in Table 7-2. According to results, as for correlation between two firm specific risk premiums (SMB & HML) are concerned, it is less than 50% and negative. Likewise SMB premium is (relatively) highly, negatively, correlated with RM (KSE risk premium). High B/M or growth stocks premium is positively correlated with the market, however the correlation is very low (34%).

Table 7-2. Multi-co linearity Results among Independent Variables, RM, SMB & HML

Description	*RM*	*SMB*	*HML*
KSE Index less Risk Free Rate- RM	1		
Small Minus Big based on size- SMB	-0.66576	1	
High Minus Low based on B/M- HML	0.339786	-0.49423	1

VIF test for Multi-colinearity

The above table indicates that there is no serious multi-colinearity problem in our model as the highest cross correlation is -66% (between SMB & RM). To formally investigate the existence of multi-colinearity between SMB and RM, this study ran the auxiliary regression between them [i.e. SMB = f(RM)] and obtained R^2. We then calculated tolerance (TOL), which is the inverse of Variance Inflating Factor (VIF), as given by the formula: $TOL = \frac{1}{VIF} = 1 - R^2$ As per the criteria higher value of TOL closer to 1 indicates low level of multi-colinearity. The results of auxiliary regression are given in Table 7-2.1. Given the value R^2 0.40, the value of TOL is 0.60 clearly indicating trivial multi-colinearity problem.

Table 7-2.1. Regression Results of SMB and RM

Panel-A			**Individual Results**
Description	***Coefficients***	***t Stat***	***P-value***
Intercept	0.0076	*2.1041	0.03749
KSE-RFR	-0.3647	*-8.9178	0.0000
Panel-B			**Collective Results**
	Regression Statistics		
Multiple R			**0.6345**
R Square			0.4026
Adjusted R Square			**0.3975**
Standard Error			0.0397
F-Stat (significance f)			**79.52 (0.000)**

*Statistically significant at 5%,

7.1.3. Regression Results

This study tested the following OLS regression model for all six portfolios formed on the basis of size and book to market.

$$R_p - R_f = a + b_m(R_m - R_f) + b_s SMB + b_h HML + \varepsilon$$

Where $(R_p - R_f)$ is excess return on a portfolio, α is intercept and β represents beta coefficients, while $(R_m - R_f)$, SMB and HML are risk proxies for market index, small firms (value stocks) and High B/M firms (Growth stocks), respectively. Left side of the equation changed with every test including S/H, B/H, S/M, B/M, S/L, B/L and finally with average excess returns of whole sample. Results are presented in Tables 7-3 to 9.

Table 7-3 Regression Results for S/H Portfolio

Dependent Variable: S_H_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003819	0.003577	1.067786	0.2878
KSE_RFR	0.702095	0.056476	12.43132	0.0000
HML_FF	0.673919	0.088610	7.605452	0.0000
SMBFF	0.889417	0.090074	9.888809	0.0000

R-squared	0.689822	Mean dependent var	[illegible]
Adjusted R-squared	0.681800	S.D. dependent var	[illegible]
S.E. of regression	0.039241	Akaike info criterion	-3.605447
Sum squared resid	0.178619	Schwarz criterion	[illegible]
Log likelihood	220.3268	Hannan-Quinn criter.	-3.567794
F-statistic	85.99279	Durbin-Watson stat	1.765727
Prob(F-statistic)	0.000000	Wald F-statistic	[illegible]
Prob(Wald F-statistic)	0.000000		

Number of companies' range from 16 to 23 with average of 20 in S/H portfolio, one of the largest in terms of number of companies. S/H includes companies which are small as well as having high book to market. Explanatory power of the variables for this

portfolio turned to be 68% with a significant F stat of 86 (0.00). Alpha value is 00.38%, however statistically insignificant. The coefficient of SMB is (90%) followed by RM (70%) and HML (67%) with significant t values at 1%. Hence, as for S/H portfolio is concerned, the FF three factor model is appropriate and explains about 2/3rd variation of cross sectional stock returns.

Table 7-4 Regression Results for B/H Portfolio

Dependent Variable: B_H_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.006662	0.004587	-1.452051	0.1497
KSE_RFR	0.815032	0.069913	11.65761	0.0000
HML_FF	0.638212	0.103091	6.190139	0.0000
SMBFF	-0.382544	0.106583	-3.589172	0.0005

R-squared	0.828895	Mean dependent var	0.005120
Adjusted R-squared	0.824470	S.D. dependent var	0.118255
S.E. of regression	0.049545	Akaike info criterion	-3.191122
Sum squared resid	0.284741	Schwarz criterion	-3.046205
Log likelihood	192.3473	Hannan-Quinn criter.	-3.132388
F-statistic	187.3156	Durbin-Watson stat	2.288496
Prob(F-statistic)	0.000000	Wald F-statistic	175.6481
Prob(Wald F-statistic)	0.000000		

In case of B/H the number of companies ranges from 5 to 8 with an average of 7, a relatively smaller portfolio during the period under review. B/H includes the firms which are big on the basis of size as well as falling in higher B/M category. Collective explanatory power, 82% with a significant F stat of 187 (0.00), of independent variables is better than any other portfolio, and only 18% variation is left unexplained during period under review. Although intercept emerged as -00.66 per month, however, statistically insignificant. Leading beta coefficient is of market index (82%), followed by

HML (64%), however SMB coefficient (-38%) turned negative. All coefficients of independent variables are statistically significant with t stat over 3 at 1%. Hence for B/H portfolio stock returns variations are explained up to 82% by FF three factors model, however size has negative impact on stock returns.

Table 7-5 Regression Results for S/M Portfolio

Dependent Variable: S_M_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.009217	0.003791	2.431373	0.0166
KSE_RFR	0.671267	0.067644	9.924267	0.0000
HML_FF	0.431163	0.110303	3.908875	0.0002
SMBFF	-0.905264	0.116504	-7.769428	0.0000

R-squared	0.576463	Mean dependent var	0.003292
Adjusted R-squared	0.565510	S.D. dependent var	0.064186
S.E. of regression	0.042929	Akaike info criterion	-3.425793
Sum squared resid	0.213772	Schwarz criterion	-3.332876
Log likelihood	209.5476	Hannan-Quinn criter.	-3.388059
F-statistic	52.62603	Durbin-Watson stat	2.364198
Prob(F-statistic)	0.000000	Wald F-statistic	40.42760
Prob(Wald F-statistic)	0.000000		

S/M portfolio is a moderate portfolio with number of companies ranging from 14-20 with an average of 16 across the study period. Collective explanatory power of the model is 56% with a significant F stat of 53 (0.00), less than any other portfolio. 44% variation in stock returns left unexplained. This result is even lesser than CAPM (chapter 6), hence no question for going to FF three factors model for this portfolio. Leading beta coefficient is of SMB (91%), followed by Market Index (67%) and HML (64%). All coefficients are statistically significant with t-value over 3 at 1%, however its overall explanatory power is much lesser than expected (and even that of CAPM); hence model

cannot be appreciated for this portfolio. Intercept value is -00.92% (per month) and is statistically significant at 5% (ideally should have insignificant).

Table 7-6 Regression Results for B/M Portfolio

Dependent Variable: B_M_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.009248	0.003708	-1.685039	0.0947
KSE_RFR	0.765263	0.067412	11.20047	0.0000
HML_FF	0.195493	0.068185	2.867107	0.0049
SMBFF	-0.057808	0.103961	-0.556059	0.5792

R-squared	0.782437	Mean dependent var	-0.001677
Adjusted R-squared	0.776810	S.D. dependent var	0.083615
S.E. of regression	0.039502	Akaike info criterion	-3.592154
Sum squared resid	0.181010	Schwarz criterion	-3.468287
Log likelihood	219.5292	Hannan-Quinn criter.	-3.544420
F-statistic	139.0596	Durbin-Watson stat	2.047233
Prob(F-statistic)	0.000000	Wald F-statistic	1892.213
Prob(Wald F-statistic)	0.000000		

In B/M portfolio the number of companies ranges from 17-23 with an average of 20 across the study period. B/M portfolio contains companies which are big on the basis of size and falling in middle as for B/M ratio is concerned. Overall explanatory power (78%) of independent variables is high with significant F stat of 139 (0.00). Intercept value is -00.62% per month, however statistically insignificant. Individual coefficient betas are led by market index (76%), followed by HML (20%), both statistically significant at 1%. However SMB turned out negative with beta coefficient, statistically insignificant, of -6%. Hence it is concluded that for B/M portfolio only two factors are significant in explaining the cross section of stock return variations i.e. market index and book to market ratio.

Table 7-7 Regression Results for S/L Portfolio

Dependent Variable: S_L_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.005168	0.004932	-1.047896	0.2969
KSE_RFR	0.857026	0.072915	11.75379	0.0000
HML_FF	-0.479823	0.097514	-4.918525	0.0000
SMBFF	0.635920	0.105093	6.053813	0.0000

R-squared	0.590052	Mean dependent var	-0.000923
Adjusted R-squared	0.579450	S.D. dependent var	0.079470
S.E. of regression	0.051537	Akaike info criterion	-3.060287
Sum squared resid	0.308098	Schwarz criterion	-2.963370
Log likelihood	187.6172	Hannan-Quinn criter.	-3.022958
F-statistic	55.66429	Durbin-Watson stat	2.197249
Prob(F-statistic)	0.000000	Wald F-statistic	49.48524
Prob(Wald F-statistic)	0.000000		

S/L is a portfolio consisting of small companies based on size and with low B/M value. Average number of companies in this portfolio is 8, across study period, with a range of 5 to 12. Over all, the explanatory power is 58% with a significant F Stat of 56 (0.00), is on the weaker side and less than that of CAPM and very close to S/M. Intercept value is -00.51% per month, however statistically insignificant. Beta coefficient is led by market index (86%), followed by SMB (64%), both statistically significant, however, HML coefficient (-48%) is negative with t value of 5. All independent variables are significant at 1%. Although the model fits well, however given the lower explanatory power than the CAPM and the negative coefficient of HML, FF three factors model may not be the best for this portfolio.

Table 7-8 Regression Results for B/L Portfolio

Dependent Variable: B_L_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.010897	0.003659	-2.978404	0.0035
KSE	0.661242	0.055440	11.92707	0.0000
HML_FF	-0.210963	0.111547	-1.891258	0.0611
SMBFF	-0.119833	0.094106	-1.273390	0.2054

R-squared	0.703947	Mean dependent var	0.002316
Adjusted R-squared	0.696284	S.D. dependent var	0.071659
S.E. of regression	0.039491	Akaike info criterion	-3.502703
Sum squared resid	0.180910	Schwarz criterion	-3.399788
Log likelihood	219.5622	Hannan-Quinn criter.	-3.460959
F-statistic	91.93801	Durbin-Watson stat	1.707097
Prob(F-statistic)	0.000000	Wald F-statistic	139.822201
Prob(Wald F-statistic)	0.000000		

The number of companies in B/L portfolio ranges from 14-24 with an average of 18 during period under review. It contains big companies on the basis of size, and simultaneously falling in low B/M category. Collective explanatory power of the independent variables is 70% with an F-stat of 92 (0.00), however 29% variation in stock returns is left unexplained by FF three factors model. Intercept value is -1% per month, statistically significant at 5% (ideally should have insignificant). Beta coefficient is led by market 66%, while SMB coefficient of -12% is statistically insignificant. HML coefficient is -21%, and statistically insignificant. Although overall explanatory power is good, however negative HML (insignificant at 5%) and insignificant SMB raises question on the validity of FF three factors model for this portfolio during period under review.

Table 7-9 Regression Results for Sample Companies Portfolio

Dependent Variable: RPT_RFR
Method: Least Squares
Sample: 1 120
Included observations: 120
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.006110	0.002997	-2.038726	0.0438
KSE_RFR	0.726743	0.050450	14.40520	0.0000
HML_FF	0.233245	0.074040	3.283305	0.0014
SMBFF	0.352872	0.077773	4.537202	0.0000

R-squared	0.758210	Mean dependent var	0.003213
Adjusted R-squared	0.751957	S.D. dependent var	0.066233
S.E. of regression	0.032987	Akaike info criterion	-3.962659
Sum squared resid	0.126222	Schwarz criterion	-3.859748
Log likelihood	241.1596	Hannan-Quinn criter.	-3.914926
F-statistic	121.2517	Durbin-Watson stat	1.961458
Prob(F-statistic)	0.000000	Wald F-statistic	109.6237
Prob(Wald F-statistic)	0.000000		

After testing the model in sections, this study included the excess returns of all companies in equally weighted sample during period under review as dependent variable and tested the FF three factors equation through OLS. Results are shown in Table 7-9. As per results overall explanatory power (75%) of FF Three Factors Model is better than that of CAPM with a significant F stat of 121 (0.00), and only 25% of variation in stock returns left unexplained, which is appreciable and favoring FF Three Factors Model over CAPM single factor model. However the negative intercept value of 00.61% (per month), and statistically significant at 5% (ideally should have insignificant), creates a question mark. Beta coefficients are all positive, statistically significant at 1%, and led by Market index with 73%, followed by SMB 35% and HML 23%. Hence it is concluded that FF Three Factors Model is superior to CAPM as for overall explanatory power is concerned for Shari'a compliant securities during period under review with significant values at 1%

for Market Index, SMB and HML. Based on evidence, we cannot reject hypothesis number three.

7.2. Modified Fama-French Model

As we documented in the CAPM study that fundamental performance measures including cash flow and earnings (in addition to B/M and size) have an impact in return generating process, hence it would be appropriate to test these variables in an extended FF three factors model. Ideally these are either fundamental performance measures which should matter in pricing of an asset (as conventional wisdom agrees on pricing of an asset as discounted expected cash flows), depicted through accounting numbers including earnings, dividends and cash flows; or market factor (as evidenced in CAPM and FF three factor).

This study would like to include the fundamental performance variables (EPS, cash flow and dividend) as well as market factors including market index and momentum variable in the extended FF model. As for dividend is concerned many growing companies do not pay dividend and practically a very large number of companies have not paid dividend during period under review. In fact only 66% of sample companies have paid dividend during 2001-10 (see Table 7-10). Given the fact that 34% companies have not paid dividend, we have not distributed companies in high/low portfolios based on dividend yield, hence D/Y variable was not included in the analysis.

Table 7-10. Distribution of Sample-Companies on the basis of Dividend Payment

Description/Years	01	02	03	04	05	06	07	08	09	10	Average
No of Companies	80	85	88	89	92	93	93	95	97	97	90
Dividend Not paid	20	23	24	30	35	37	31	40	37	33	30
Dividend Paid	60	62	64	59	57	56	62	55	60	64	60
% of Cos. Div. paid	75	73	73	66	62	60	67	0.58	62	66	66

We have used following variables including Market index, SMB, HML based on B/M, LMH based on PER, HML based on CFY and WML based on median returns of prior period, in regression analysis. To calculate RM, this study has deducted risk free return from average monthly returns of market portfolio. In order to obtain SMB, procedure of FF is used. Every year companies' returns were sorted on the basis of previous year market equity and sample broken into big and small on the basis of median size. For HML we have used different procedure than FF and companies were sorted on the basis of book to market ratio of previous year figures on the day of closing. Sample broken into two parts as High and Low based on median figure of B/M ratio, based on methodology of Ammann et al (2008). Unlike FF three factor model our methodology includes all companies in sample for calculation of HML based on B/M. To get the figure of LMH-low minus high- based on PER, this study has arranged companies in order based on last year's accounting figure on earning/ME. Sample broken into two parts as low PER and high PER based on median figure. Likewise HML based on CFY was calculated on the basis of last year cash flow/ME, then sample divided between HCFY & LCFY on the basis of median figure. Momentum variable is used to account for (psychological) market impact on investor, first identified by Jagdeesh and Titman (1993)

and later on used by Carhart (1997) and Ammann & Steiner (2008). Results are presented as descriptive statistics, trends in series, Multi-co linearity and regression analysis.

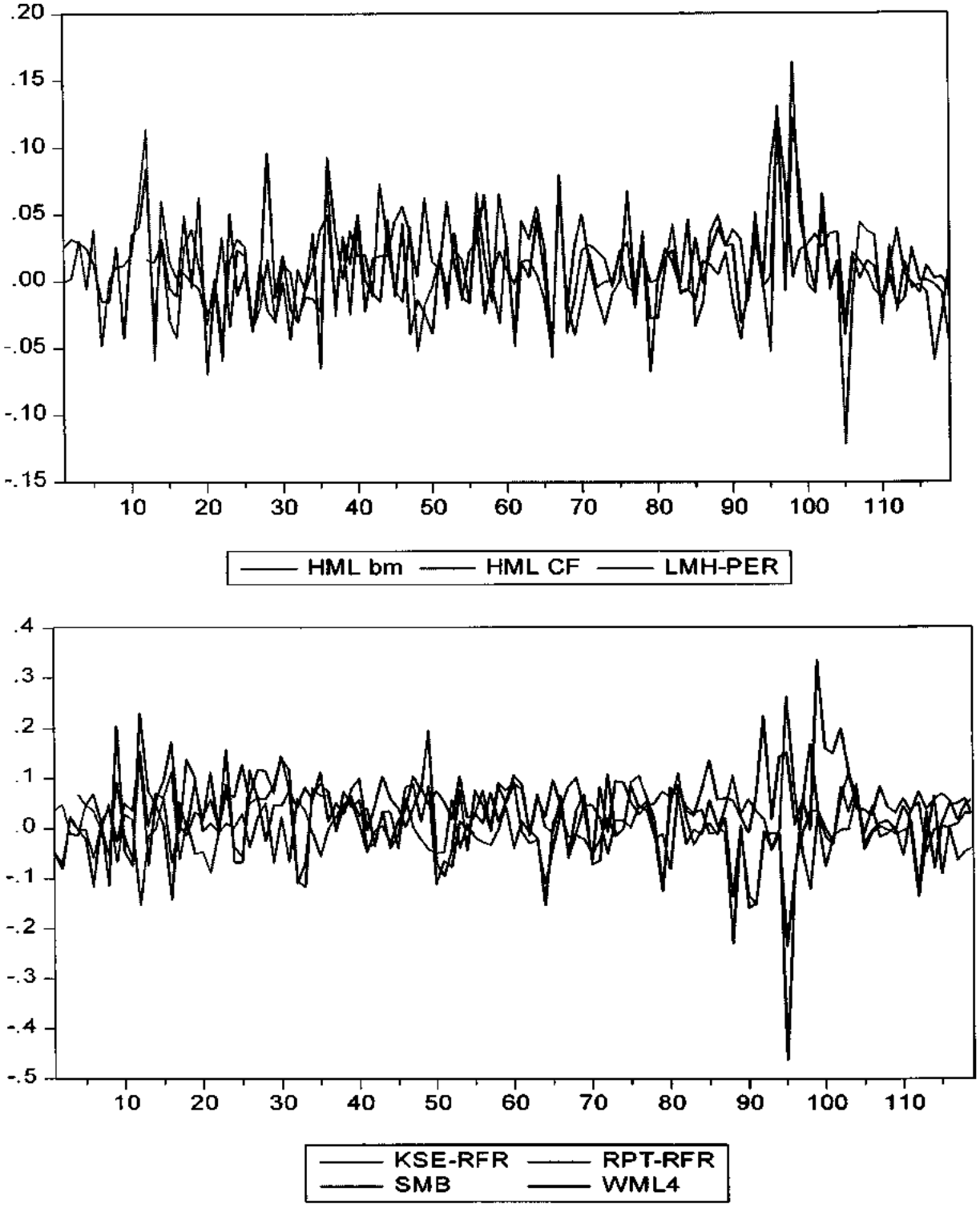
7.2.1. Descriptive Statistics and Trends

Table 7-11 presents descriptive statistics and figure 7-1 trends in returns of series. As per table average monthly excess return of sample is 00.60% while of market is 0.01%, with standard deviation of 07% & 09% respectively, hence sample variation is much higher than market as depicted by CV. Out of the series most variation is in average excess returns of SMB sample, followed by Sample and market. Least volatile series is the winners minus losers.

Table 7-11. Descriptive Statistics of Series

	HML_BM	HML_CF	KSE_RFR	LMH_PER	RPT_RFR	SMB	WML4
Mean	0.009	0.014	0.012	0.006	0.006	0.003	0.061
Median	0.001	0.015	0.014	0.001	0.003	0.001	0.056
Maximum	0.122	0.125	0.231	0.164	0.155	0.261	0.335
Minimum	(0.070)	(0.057)	(0.461)	(0.122)	(0.235)	(0.153)	(0.072)
Std. Dev.	0.037	0.031	0.089	0.039	0.068	0.052	0.056
Skewness	0.630	0.313	(1.523)	0.795	(0.578)	0.773	1.369
Kurtosis	3.762	3.758	9.620	6.200	3.776	7.553	7.956
Coef . Var	4.293	2.205	7.384	6.695	12.008	16.839	0.914
Jarque-Bera	9.766	4.355	238.957	57.449	8.726	104.042	144.282
Probability	0.008	0.113	-	-	0.013	-	-
Sum	0.926	1.507	1.300	0.629	0.611	0.336	6.594
Sum Sq. Dev.	0.145	0.101	0.846	0.163	0.493	0.294	0.333
Observations	108	108	108	108	108	108	108

Figure 7-1. Trends in returns of series B/M, CF, PER, KSE, RPT, Size, Momentum



7.2.2. Multi-co-linearity

Multi-co linearity test was essential given the increased number of variables. This research calculated correlation among independent variables and results are presented in Table 7-12. As per results, highest correlation (0.63) is found between HML-B/M and LMH-PER, followed by –ve correlation between market risk premium and SMB (-0.62) and least correlation (0.01) between WML and HML-BM. No pair of variables carries abnormal correlation, leading to elimination of any, hence all variables are forming part of econometric model.

Table 7-12. Multi-colinearity among Independent variables

	HML_BM	HML_CF	KSE_RFR	LMH_PER	RPT_RFR	SMB	WML4
HML_BM	1.000						
HML_CF	0.235	1.000					
KSE_RFR	0.089	(0.291)	1.000				
LMH_PER	0.636	0.298	0.173	1.000			
RPT_RFR	0.187	(0.235)	0.833	0.265	1.000		
SMB	0.040	0.123	(0.616)	(0.136)	(0.347)	1.000	
WML4	(0.011)	(0.039)	(0.068)	0.089	(0.021)	0.072	1.000

VIF test for Multi-colinearity

The above table indicates that there is no serious multi-colinearity problem in our model as the highest cross correlation is 63% (between BM &PER). To formally investigate the existence of multi-colinearity between BM and PER, we run the auxiliary regression between them [i.e. BM = f(PER)] and obtain R^2. We then calculated tolerance (TOL), which is the inverse of Variance Inflating Factor (VIF), as given by the formula: $TOL = \frac{1}{VIF} = 1 - R^2$ As per the criteria higher value of TOL closer to 1 indicates low level of multi-colinearity. The results of auxiliary regression are given in Table 7-13. Given the

value of R^2 0.37, the value of TOL is 0.63 clearly indicating trivial multi-colinearity problem.

Table 7-13. Regression Results of BM and PER

Panel-A			**Individual Results**
Description	***Coefficients***	***t Stat***	***P-value***
Intercept	0.0059	*2.2453	0.0266
PER	0.5865	*8.4582	0.0000
Panel-B			**Collective Results**
	Regression Statistics		
Multiple R			0.6143
R Square			0.3774
Adjusted R Square			0.3721
Standard Error			0.0286
F-Stat (significance f)			71.54 (0.000)

*Statistically significant at 5%

7.2.3. Econometric Results

Results of OLS-regression are presented here under. First this study included PER variable in FF three factors and results are presented in Table 7-14. As per results, overall explanatory power is 75.32% with F stat of 91 (0.00) and Durbin-Watson 1.92, which is slightly better than FF three factors, but negligible. Beta coefficient is led by market index, followed by SMB, however HML-B/M turned insignificant (P value 0.73) with the inclusion of LMH-PER, although LMH-PER is also significant at 8%. Results are providing evidence in favor of earnings as opposed to book to market. We got the evidence of impact of earnings on stock returns of sample at KSE, which is theoretically stronger than B/M, being fundamental performance measure. Hence it is concluded that B/M is not a proxy of risk in domestic market, rather it is replaced by earnings.

Table 7-14. Results of Extended FF (Four factor model) with inclusion of PER

$$R_p - R_f = a + b\left(R_m - R_f\right) + b_s\,SMB + b_h HML + b_p LMH + \varepsilon$$

Dependent Variable: RPT_RFR
Method: Least Squares
Sample: 1 119
Included observations: 119
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.005964	0.003022	-1.973464	0.0509
KSE_RFR	0.736022	0.048427	15.19887	0.0000
HML_BM	0.037421	0.110170	0.339670	0.7346
SMB	0.345198	0.080135	4.307659	0.0000
LMH_PER	0.195225	0.110825	1.761569	0.0809

R-squared	0.761575	Mean dependent var	0.002468
Adjusted R-squared	0.753210	S.D. dependent var	0.066364
S.E. of regression	0.033013	Akaike info criterion	-3.942723
Sum squared resid	0.124244	Schwarz criterion	-3.820654
Log likelihood	239.5919	Hannan-Quinn criter.	-3.893305
F-statistic	91.03467	Durbin-Watson stat	1.950696
Prob(F-statistic)	0.000000	Wald F-statistic	39.62480
Prob(Wald F-statistic)	0.000000		

As a further step in identification of variables and in search of increased prediction power, this study included Cash flow yield (CFY) in analysis and results are presented in Table 7-15. As per results overall explanatory of model is 74% with F Stat of 63 (0.000) and Durbin-Watson statistics 1.95, showing overall goodness of fit of model. Cash flow variable turned insignificant (P value 0.59) along with book to market (P value 0.87). Beta coefficient of earnings variable has increased by 4%, and become significant at 5%, while of market index and SMB is almost same. Intercept has turned insignificant in five factor model.

Table 7-15. Results of Five Factor Model with Cash Flow

$$R_p - R_f = a + b\left(R_m - R_f\right) + b_s\,SMB + b_h HML + b_p LMH + b_f HMLCF + \varepsilon$$

Dependent Variable: RPT_RFR
Method: Least Squares
Sample (adjusted): 12 119
Included observations: 108 after adjustments
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.004924	0.003971	-1.239868	0.2179
KSE_RFR	0.737933	0.057037	12.93777	0.0000
HML_BM	0.018968	0.117864	[illegible]	0.8725
HML_CF	-0.068198	0.127964	[illegible]	[illegible]
LMH_PER	0.239220	[illegible]	[illegible]	[illegible]
SMB	0.350323	0.085344	[illegible]	[illegible]

R-squared	0.756468	Mean dependent var	[illegible]
Adjusted R-squared	0.744530	S.D. dependent var	[illegible]
S.E. of regression	0.034322	Akaike info criterion	[illegible]
Sum squared resid	0.120159	Schwarz criterion	[illegible]
Log likelihood	214.0127	Hannan-Quinn criter.	[illegible]
F-statistic	63.36713	Durbin-Watson stat	[illegible]
Prob(F-statistic)	0.000000	Wald F-statistic	[illegible]
Prob(Wald F-statistic)	0.000000		

For further analysis, this study included momentum factor measured as Winners minus losers of past. Results are presented for four month lag (of momentum) in Table 7-16. As per results collective explanatory power of independent variables is good, taking adjusted R square to 75%, which is slightly higher than FF Three factor model, with significant F stat of 70 (0.00) and Durbin-Watson stat 1.90. Intercept value is -00.73% per month and also statistically insignificant. As for predictors are concerned, these include market index and size at 1% while PER at 10%. HML based on B/M is no more statistically significant. Also momentum variable is insignificant.

Table 7-16. Results of Five Factors Model with Momentum

$$R_p - R_f = a + b\left(R_m - R_f\right) + b_s\,SMB + b_h HML + b_p LMH + b_m WML + \varepsilon$$

Dependent Variable: RPT_RFR
Method: Least Squares
Sample (adjusted): 4 119
Included observations: 116 after adjustments
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.007356	0.004224	-1.741483	0.0844
KSE_RFR	0.734518	0.048518	15.13909	0.0000
HML_BM	0.050102	0.111826	0.448034	0.6550
LMH_PER	0.183801	0.113750	1.615829	0.1090
SMB	0.344397	0.079691	4.321662	0.0000
WML4	0.028444	0.044009	0.646316	0.5194

R-squared	0.759893	Mean dependent var	0.004413
Adjusted R-squared	0.748979	S.D. dependent var	0.066790
S.E. of regression	0.033463	Akaike info criterion	-3.904489
Sum squared resid	0.123177	Schwarz criterion	-3.763973
Log likelihood	232.5712	Hannan-Quinn criter.	-3.847583
F-statistic	69.62578	Durbin-Watson stat	1.908457
Prob(F-statistic)	0.000000	Wald F-statistic	66.11377
Prob(Wald F-statistic)	0.000000		

Beta coefficient is led by market index (73%), followed by SMB (34%) and LMH-PER 18%. Hence it is concluded that model fit well to the data and only 25% of variation remained unexplained, while Market Index, size and PER are significant explanators of cross section stock returns of Shari'a compliant sample during period under review. In our model PER has replaced B/M, which has support from theory, [makes more sense], being fundamental performance measure of a company. Further this study accounted for all companies in sample in calculation of HML-B/M and LMH-PER, which represents the returns of whole sample, unlike FF where middle 40% of companies was not part of calculation of risk proxy as HML.

Table 7-17. Results of Modified FF 3-Factors' Model

$$R_p - R_f = a + b\,(R_m - R_f) + b_s\,SMB + b_p LMH + +\varepsilon$$

Dependent Variable: RPT_RFR
Method: Least Squares
Sample: 1 119
Included observations: 119
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.005793	0.003082	-1.879793	0.0627
KSE_RFR	0.736685	0.048603	15.15721	0.0000
LMH_PER	0.217957	0.101001	2.157954	[illegible]
SMB	0.349854	0.080403	4.351239	0.0000

R-squared	0.761337	Mean dependent var	0.003968
Adjusted R-squared	0.755111	S.D. dependent var	0.066464
S.E. of regression	0.032886	Akaike info criterion	-3.958528
Sum squared resid	0.124368	Schwarz criterion	-3.865113
Log likelihood	239.5324	Hannan-Quinn criter.	-3.920596
F-statistic	122.2836	Durbin-Watson stat	1.934722
Prob(F-statistic)	0.000000	Wald F-statistic	[illegible]
Prob(Wald F-statistic)	0.000000		

We finally got a pricing model (Table 7-17) for Shari'a compliant securities in domestic market. This model gives maximum explanation (76%) for variation in cross section returns, based on three factors including market risk premium (74%), SMB based on size (35%), LMH based on PER (22%). Market and size are significant at 1% while earnings at 3% significance level So the pricing equation for Shari'a compliant securities turned as under: $R_t - R_f = \ 0.74\ M_p + 0.35\ SMB_{me} + 0.22 LMH_{per} + \varepsilon$

This is the final model with an accuracy of 76%, however still 24% of variation is unexplained and needs further research and identification of variables to be used as risk proxy for unexplained portion of variation.

To summarize, in this section, we tested the FF three factors model and found better than CAPM, as for capturing of cross section stocks returns are concerned. FF

three factors model explained variation up to 75% which is better than CAPM (70%) single risk factor, hence we cannot reject hypothesis # 3. However as FF model lacks theoretical support as for B/M variable is concerned, because B/M is not a traditional accounting performance measure. Further in FF model average returns of middle 40% companies are ignored in calculation of high minus low figure, hence, this research modified FF model by taking care of middle 40% companies return, and included price earnings, cash flow and momentum effect in the model. Results of modified model are better than original FF three factors. In fact explanatory power increased to 76% which is better than CAPM (70%) and FF three factors (75%). B/M, CFY and momentum turned insignificant and we left with three factors explaining variations in cross section returns of Shari'a Compliant securities, during period under review, including market risk premium, SMB-size, and LMH-per. Based on evidence we accept hypothesis # 4. Modified FF is recommended model for security pricing due to its diversified variables (both fundamental and market) and better explanatory power. Still 24% of variations is unexplained, hence further research and identification of variables is required.

CHAPTER 8

CONCLUSION

This study was conducted on the Shari'a compliant sample of companies on Karachi Stock Exchange, covering ten years period (01/01-12/10). All 100 companies screened by Al-Meezan Investment Management Limited (AIML) at the end of 2009, were included except three financial companies. Number of companies has increased over sample period from 78 in 2001 to 97 in 2010, a difference of 19 leading to average annual increase of two companies, approximately. This analysis started with the application of traditional CAPM and found capturing of stock returns variation of sample by market risk premium up to 70%, which is higher than global average of CAPM results. Results for CAPM and SCAPM was not much different, although SCAPM results turned slightly better than CAPM, hence it is concluded that use of inflation or risk free rate as intercept does not make a meaningful economic difference (although legal position is different) in the results of sample companies, during the period under review. In the study process we found returns' differences based upon size, B/M, PER and CFY; however theory of CAPM could not be validated as betas were not in-line with returns, so the evidence emerged on CAPM anomalies in case of size, B/M, CFY and PER. This

study could not document impact of dividend yield on stock returns generating process due to lesser number of companies paid dividend during study period.

In the second phase of the study, macroeconomic variables were tested as predictors of stock returns variation in Shari'a compliant securities' sample at KSE. This research included eleven macroeconomic variables including market index exchange rate, inflation, interest rate, industrial production index (proxy for GDP), foreign direct investment, remittances of expatriates, money supply, oil prices, exports and gold prices. Total variation in stock returns, explained by macroeconomic variables is highly appreciable [value of adjusted R Square is 96%]. Only four (out of eleven) macroeconomic variables are significant at 1% including market index, exchange rate, interest rate and foreign direct investment. KSE-100 index is the most important variable in predicting variations in stock returns of Shari'a compliant sample during period under review; hence investors should have an eye on the movement of KSE 100 index in their choice of portfolio. The second important variable is the exchange rate movement and depreciation in local currency leads to higher demand of stock returns by investors. Increase in exchange rate leads to more revenue by firms engaged in exports which is being priced by stock market. As expected interest rate has negative correlation with stock returns because any increase in interest rate leads to diversion of investment from risky avenues to risk free opportunities. And finally FDI has shown positive impact on stock returns, as more FDI leads to overall more economic activities and more profits for firms which are being priced at stock exchange.

In the third phase of the study, this research tested Fama & French three factors model which shown its worth in local market by explaining 75% variation in stock returns, during the period under review. FF three factors model turned out superior than CAPM single factor with increased explanation of cross section returns' variations as well as diversified variables including B/M, size and market index. However given the lack of theoretical support for FF three factors model, this study tested modified Fama & French model by inclusion of both firm level performance measures and market based factors. In the process, we included four firm based variables size, B/M, CFY and PER; as well as two market based factors including market risk premium and momentum. Results were better than CAPM and FF three factors model. Modified FF has theoretical support for inclusion of PER, being accounting performance measure, which taken over explanatory power from B/M. Also evidence could not support impact of CFY and momentum on returns generating process. Modified FF explained stock returns variations up to 76% with diversified significant variables including market index, size and PER, covering both impacts (firm performance and market) on the mind of investor in pricing decision. Modified FF is recommended for pricing of Shari'a compliant securities on KSE, however still 24% variation in stock returns left unexplained, which could be future research agenda.

Whether results of this study are generalize able or specific to sample, I calculated correlation between average stock returns of sample and market during period under review (120 monthly observations) and result was 84%, hence these results are very much applicable to whole Karachi stock exchange.

Results of this study are very useful for domestic Islamic finance industry including Islamic financial institutions, investment management companies, Islamic money market funds and Shari'a compliant investors in general. Stock market index movement turned very significant variable as predictor of stock returns along with earnings and size of the companies. From macro-economic variables, exchange rate, foreign direct investment and interest rate turned significant predictors of variations in cross section stock returns. Investors of Shari'a compliant securities need to have an eye on the movement of these variables to earn superior returns.

As Islamic finance is real sector based financial system, hence it was expected that real sector variables including oil prices and industrial production would have strong impact in pricing of securities. Diversion from theoretical results could be due to many factors including lesser market share of Shari'a compliant investors and major role of conventional investors in domestic market; as Shari'a compliant securities can be traded by both types of investors. Results of this study (Shari'a compliant sample) are not very different from other studies conducted on KSE, using stock market returns, irrespective of their Shari'a compliant status (e.g. Butt & Rehman, 2010; Hasan & Javed, 2009; Mohammad, et. al, 2009; Qayyum & Kemal, 2006; Azam, 2011), perhaps due to following reasons. First; Islamic financial industry uses KIBOR (Karachi Inter Bank Offered Rate) as bench mark rate, for determining profit rate, in pricing assets due to competition with conventional banking industry; in the absence of its own bench mark for profit, hence, it offers a link between conventional financial sector and Islamic financial industry. Second; Share trading of Shari'a compliant companies is not limited to Islamic financial industry rather it is open to every investor. In fact Islamic financial

industry with a market share of about 10% is not in a position to dominate and set prices, rather works as a price taker in domestic market. Furthermore only small amounts of funds are invested by Islamic Financial Institutions in stock market given the risky nature of its operations. Third; share of Islamic finance in assets of domestic financial market is very low and has reached to about 10% in 2013 which was much lesser in earlier years; hence its impact cannot change the whole market mechanism immediately. With the growth and expansion of Islamic finance, which is very promising so far (in last ten years average annual growth of 63%), it is expected that Islamic finance would create its own profit bench mark, consequently changes in Shari'a compliant stock returns.

Based on results, we suggest certain policy recommendations to policy makers and regulators as under. Transparency in KSE index is utmost required being leading indicator of economy. Furthermore interest rate should be reduced to let the economy flourish. FDI must be encouraged and more facilities should be provided to foreign investors and finally exchange rate should be controlled given the trade deficit on international trade account. Also more transparency in earnings disclosure by companies should be ensured through audit and corporate governance mechanism.

Limitations of Study

1. Modern Islamic financing is at infant stage in Pakistan and Shari'a screening criteria was developed by AIML in 2008 in domestic market hence Shari'a compliance status of sample companies earlier than 2008 is neutral. This is an initial study in this regard and these results are based upon the data relating to 2001-10; hence at best we can say these

results are relating to the past of those companies which are now screened as Shari'a compliant companies.

2. Also Islamic finance is progressing and expanding at an average annual growth rate of 28% and by the end of September 2013, it covers just 10% of market share. Shari'a compliant securities are open to investment by Islamic as well as conventional finance industry; hence role of conventional finance industry in asset valuation cannot be underestimated. In fact being 90% shareholder of financial market, conventional finance has major role in pricing of Shari'a compliant assets.

Future Research Areas

Future research areas include valuation of securities by using Islamic index as proxy for risky assets; as well as study of Shari'a compliant securities on other markets to confirm or otherwise findings of this research. Also a study can be planned to document evidence whether Shari'a screening has created any impact on valuation of securities. Furthermore Sukuk market is getting momentum in local market and evidence on Sukuk market would be a contribution in literature.

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APENDIX-A: List of Companies

1. List of Shari'a Compliant Companies (SCC) [December 2009]

Shariah Screening Criteria (for equity securities)[22]

Shariah compliance of stocks is done under the guidance of qualified and reputed Shariah experts. For stocks to be "Shariah compliant", it must meet ALL the six key tests given below.

a. **Business of the Investee Company**

Core business of the company must be halal and in line with the dictates of Shariah. Hence, investment in securities of any company dealing in conventional banking, conventional insurance, alcoholic drinks, tobacco, pork production, arms manufacturing, pornography or related activities is not permissible.

b. **Debt to Total Assets**

Debt to Asset ratio should be less than 40%. Debt, in this case, is classified as any interest bearing debts. Zero coupon bonds and preference shares are, both, by definition, part of debt.

c. **Non-compliant Investments to Total Assets**

The ratio of non-compliant investments to total assets should be less than 33%. Investment in any non-compliant security shall be included for the calculation of this ratio.

d. **Non-complaint Income to Total revenue – Purification of Non-compliant income**

The ratio of non-compliant income to total revenue should be less than 5%. Total revenue includes Gross revenue plus any other income earned by the company. This amount is cleansed out as charity as a pro rata ratio of dividends issued by the company.

e. **Illiquid Assets to Total Assets**

The ratio of illiquid assets to total assets should be at least 20%. Illiquid asset, here, is defined as any asset that that Shariah permits to be traded at value other than the par.

f. **Net Liquid Assets to Share Price**

The market price per share should be greater than the net liquid assets per share calculated as: (Total Assets – Illiquid Assets – Total Liabilities) divided by number of shares.

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1. Abbott Laboratories (Pakistan) Limited
2. Ados Pakistan
3. Agriautos Industries
4. AL-Ghazi Tractors
5. AL-Noor Suger
6. Artistic Denim Mills
7. Atlas Battery
8. Atlas Honda
9. Attock Cement
10. Attock Petroleum
11. Attock Refinery
12. Balochistan Wheels
13. Bankislami Pakistan
14. Bannu Woollen
15. Bata Pakistan
16. BOC Pakistan
17. Bolan Casting
18. Clariant Pak
19. Clover Pakistan
20. Colgate Palmolive
21. Crescent Steel
22. D.G.K.Cement
23. Dadabhoy Cement
24. Dewan Farooque Sp.
25. Dynea Pakistan
26. Fauji Fert Bin
27. Fauji Fertilizer
28. Ferozsons (Lab)
29. Flying Cement
30. Ghandhara Industries
31. Ghandhara Nissan
32. Ghani Automobile
33. Ghani Glass Limited
34. GlaxoSmithKline
35. Grays of Cambridge
36. Habib Sugar Mills
37. Habib-ADM
38. Hinopak Motor
39. Honda Atlas Cars
40. Huffaz Pipe
41. IBL HealthCare Ltd
42. ICI Pakistan
43. Indus Motor Company
44. Johnson & Philips
45. K.E.S.C.

46. K.S.B.Pumps
47. Kohat Cement
48. Kohinoor Energy
49. Kohinoor Power
50. Lafarge Pakistan
51. Lotte Pakistan
52. Lucky Cement
53. Maple Leaf Cement
54. Mari Gas
55. Meezan Bank
56. Mehran Sugar
57. Millat Tractors
58. Modarba Al Mali
59. National Foods
60. National Refinery
61. Nishat (Chunian)
62. Noon Pak
63. Noon Sugar Mills
64. Oil & Gas Development Company
65. P.S.O.
66. P.T.C.L.A
67. Packages Limited
68. Pak Datacom
69. Pak Elektron
70. Pak Engineering
71. Pak Oilfields
72. Pak Pap.Products
73. Pak Petroleum Ltd.
74. Pak Refinery
75. Pak Suzuki Motor
76. Pak Synthetics
77. Ravi Textile
78. Sanghar Sugar
79. Sazgar Engineering
80. Searle Pakistan
81. Service Industries
82. Shell Gas LPG
83. Shell Pakistan
84. Siemens Pakistan
85. Sitara Chemical
86. Sitara Energy
87. Sitara Peroxide
88. Sui North Gas
89. Sui South Gas
90. Tandlianwala Sugar

91. Tariq Glass
92. Telecard
93. Thal Ltd
94. Thatta Cement
95. Tri-Pack Films
96. UniLever Pakistan
97. United Distributors
98. Wah-Noble
99. Wyeth Pak
100. ZIL Limited

2. List of Karachi Stock Exchange Index (KSE-100) Companies [December 2009]

1. Abbott Laboratories
2. Adamjee Insurance
3. AL-Ghazi Tractors
4. Allied Bank Ltd.
5. Arif Habib Sec.SD
6. Askari Bank
7. Atlas Honda Ltd.
8. Attock Cement XD
9. Attock PetroleumXDXB
10. Attock Refinery
11. Azgard Nine
12. B.O.Punjab
13. Bank Al-Falah
14. Bank AL-Habib
15. Bata (Pak) Ltd.
16. Bestway Cem
17. Byco Petroleum
18. Clariant Pak
19. Colgate Palmol.
20. D.G.K.Cement
21. Dawood Hercules
22. Dreamworld
23. East West Insurance
24. EFU General InsXB
25. EFU Life Assur.XB
26. Engro Corporation
27. Engro Polymer
28. Fauji Cement
29. Fauji Fert Bin Qasim
30. Fauji Fertilizer Co.
31. Faysal Bank
32. Ghani Glass Ltd.XDXB
33. GlaxoSmithKline Pak.
34. Grays of Cambr.XD
35. Habib Bank Ltd.
36. Habib Metro Bank
37. Hub Power Co.
38. Ibrahim FibresXD
39. ICI Pakistan
40. IGI Insurance
41. Indus Motor Company
42. Int. Ind.Ltd.
43. Jah.Sidd. Co.
44. Javedan Cement
45. K.E.S.C.
46. KASB Bank Ltd.
47. Kohinoor EnergyXD

48. Kot Addu Power XD
49. Lafarge Pakistan
50. Lakson Tobacco
51. Lotte Pakistan PTA
52. Lucky Cement XD
53. Mari Gas
54. MCB Bank Ltd.
55. Media Times Ltd
56. Meezan Bank Ltd.
57. Millat TractorsXB
58. Murree BreweryXDXB
59. National Bank
60. National Refin XD
61. Nestle Pakistan Ltd.
62. Netsol Technol.XD
63. New Jubilee Insuranc
64. NIB Bank
65. Nishat Mills Ltd XD
66. Oil & Gas Deve.
67. P.I.A.C.(A)
68. P.N.S.C. XD
69. P.S.O.
70. P.T.C.L.A
71. Pace (Pak) Ltd.
72. Packages Limited
73. Pak Elektron Ltd.
74. Pak Oilfields XD
75. Pak Petroleum Ltd.
76. Pak Refinery
77. Pak Reinsurance Ltd
78. Pak Services
79. Pak Suzuki Motor Co.
80. Pak Telephone
81. Pak Tobacco
82. Pak.Int.Con. XD
83. Pakistan Cables
84. PICIC Growth Fund
85. Rafhan Maize Product
86. Royal Bank
87. Security Paper Ltd.
88. Shell Pakistan
89. Shifa Int.Hospitals
90. Siemens Pak
91. Soneri Bank Limited
92. Stand.Chart.Bank
93. Sui North Gas
94. Sui South GasXDXB
95. Thal Ltd XDXB
96. TRG Pakistan Ltd.

97. Unilever Foods Ltd
98. UniLever Pak
99. United Bank Ltd.
100. WorldCall Telecom

3. List of Companies Common in SCC and KSE-100 Index [December 2009]

1. Abbott Laboratories
2. AL-Ghazi Tractors
3. Atlas Honda Ltd.
4. Attock Cement XD
5. Attock PetroleumXDXB
6. Attock Refinery
7. Bata (Pak) Ltd.
8. Clariant Pak
9. Colgate Palmol.L
10. D.G.K.Cement
11. Fauji Fert Bin Qasim
12. Fauji Fertilizer Co.
13. Ghani Glass Ltd.XDXB
14. GlaxoSmithKline Pak.
15. Grays of Cambr.XD
16. ICI Pakistan
17. Indus Motor Company
18. K.E.S.C.
19. Kohinoor EnergyXD
20. Lafarge Pakistan
21. Lotte Pakistan PTA
22. Lucky Cement XD
23. Mari Gas
24. Meezan Bank Ltd.
25. Millat TractorsXB
26. National Refin XD
27. Oil & Gas Deve.
28. P.S.O.
29. P.T.C.L.A
30. Packages Limited
31. Pak Elektron Ltd.
32. Pak Oilfields XD
33. Pak Petroleum Ltd.
34. Pak Refinery
35. Pak Suzuki Motor Co.
36. Shell Pakistan
37. Siemens Pak
38. Sui North Gas
39. Sui South GasXDXB
40. Thal Ltd XDXB
41. UniLever Pak

APENDIX-B: Cointegration Output

*Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):*

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
-0.001749	-0.00017	0.0016	0.0003	-0.0070	-0.1346	0.000805	4.62E	0.0260	0.0436	-0.0050	-0.5864	0.0898
0.000452	0.0001	-0.00977	0.0002	-0.01687	0.5289	-0.000199	1.04E-	-0.01739	-0.28780	-0.00344	-0.06228	-0.286082
0.000873	0.0001	-0.0095	0.0007	0.0200	0.6265	-0.001585	-3.73E-06	0.027645	-0.267718	0.004717	-0.633485	0.339131
-0.000352	-0.000122	-0.002631	-0.000708	-0.008662	0.000980	0.001485	-8.41E-06	0.047792	0.395161	0.002769	0.147458	-0.033007
-0.000605	-0.000137	-0.012219	0.000199	-0.014292	0.267209	0.001232	3.55E-06	-0.014179	-0.035431	0.010344	0.102195	-0.074944
2.52E-06	0.000168	-0.000768	-8.65E-05	-0.013103	0.285555	-0.000818	2.16E-06	0.012256	-0.191536	0.016570	-0.209941	0.024232
0.000314	0.000114	0.004771	0.000380	0.001413	0.025092	-0.002163	2.19E-05	0.000378	-0.288624	-0.022848	-0.596754	-0.301035
0.000281	-0.000106	-0.006905	-0.000297	0.000799	0.452049	-0.000908	-6.64E-06	0.014763	0.207859	-0.017254	-0.504324	0.413454
0.000173	-6.47E-05	0.005094	0.000844	-0.012773	0.556875	-0.000491	-3.35E-06	-0.026036	-0.119772	0.002122	0.027020	0.086019
-0.001122	4.02E-05	-0.000912	-0.000495	0.009346	-0.663624	0.000636	1.46E-05	-0.007135	-0.079592	-0.004523	0.200238	-0.344143
-0.000397	5.55E-05	-0.003706	-0.000359	-0.007697	1.005409	7.54E-05	-1.78E-05	-0.002660	0.494544	-0.017331	-0.813841	0.458352
0.000362	-0.000132	-0.000995	-0.001151	-0.001959	-0.219543	0.000295	1.61E-05	0.009406	0.161305	0.018322	0.140043	-0.620040

Unrestricted Adjustment Coefficients (alpha):

D(RPT_DS)	92.41619	38.73269	-9.781267	-32.82273	-18.58754	-32.99241	-55.88758	-34.11517	6.318046	36.94575	54.05734	29.49825
D(EX)	98.51426	-13.23313	-525.0784	-1141.959	-9.607325	-1934.747	1114.327	362.9240	528.2403	-65.57987	-1005.043	367.3083
D(FDI)	-22.73679	31.85119	29.10501	3.885954	36.67531	-11.06809	-23.17117	38.44712	2.857371	5.397815	2.535851	2.469836
D(GP)	-169.6398	-157.4563	-165.8030	3.743087	44.72854	124.7254	7.382189	-42.99689	-75.12870	33.41301	42.62176	24.21782
D(IP)	0.745697	9.620984	-6.047573	4.875375	0.220256	9.197144	2.207711	-0.343633	7.608412	-4.023038	0.391504	0.525336
D(IR)	0.023838	0.126881	-0.159122	0.021646	-0.026494	-0.055162	-0.027768	0.021293	-0.035769	0.023097	-0.008800	-0.001925
D(KSE_INDEX)	302.9971	-136.7386	-14.36492	16.37735	126.6844	34.68426	63.91162	141.4479	31.79146	59.02332	-6.833548	-27.04936
D(MS)	8725.001	-6945.347	-6227.952	4195.428	-2427.235	-5088.797	-5360.003	12204.76	-1916.224	-14510.15	3832.688	1068.382
D(OP)	-0.971829	0.333443	-2.310881	-8.479800	3.961847	-2.036267	-0.065109	-1.502304	-0.014992	0.020279	0.587568	-0.393117
D(PI)	0.080622	0.115174	0.009378	0.168523	0.283911	0.125347	0.292325	-0.163606	-0.198908	-0.083984	-0.086666	0.022672
D(WR)	-3.473776	1.221983	-4.001433	0.669927	2.202727	-8.640392	17.49528	-2.104195	0.746438	-2.382679	4.228878	-0.656593
D(XR)	-0.053387	0.118707	-0.016679	-0.218686	-0.175850	0.141562	0.088509	0.050162	-0.058862	-0.002016	-0.009624	0.033709

1 Cointegrating Equation(s): **Log likelihood -6198.733**

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.097983	-0.959456	-0.217077	4.025178	76.98233	-0.460498	-0.002644	-14.87186	-24.98319	2.883769	335.2998	-51.38042
	(0.01707)	(0.90925)	(0.10305)	(1.64504)	(68.1991)	(0.12402)	(0.00173)	(3.75691)	(63.7478)	(1.89387)	(91.5633)	(47.4587)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.161634
	(0.07108)
D(EX)	-0.172300
	(1.31178)
D(FDI)	0.039766
	(0.02636)
D(GP)	0.296697
	(0.10758)
D(IP)	-0.001304
	(0.00676)
D(IR)	-4.17E-05
	(7.0E-05)
D(KSE_INDEX)	-0.529937
	(0.10987)
D(MS)	-15.25987
	(11.0301)
D(OP)	0.001700
	(0.00334)
D(PI)	-0.000141
	(0.00022)
D(WR)	0.006076
	(0.00844)
D(XR)	9.34E-05
	(0.00013)

2 Cointegrating Equation(s): Log likelihood -6149.064

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.000000	7.555349	-0.575569	21.06442	-373.3752	-0.468671	-0.013169	-5.150204	227.0138	7.212003	530.3360	188.1609
		(2.28796)	(0.23938)	(4.10803)	(171.173)	(0.27758)	(0.00423)	(8.82566)	(135.044)	(4.73358)	(229.222)	(119.355)
0.000000	1.000000	-86.90097	3.658717	-173.9003	4596.289	0.083409	0.107413	-99.21793	-2571.848	-44.17338	-1990.513	-2444.727
		(19.7129)	(2.06248)	(35.3945)	(1474.81)	(2.39162)	(0.03641)	(76.0412)	(1163.53)	(40.7842)	(1974.96)	(1028.35)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.144109	-0.009956
	(0.07282)	(0.00923)
D(EX)	-0.178287	-0.018892
	(1.35496)	(0.17173)
D(FDI)	0.054178	0.008733
	(0.02612)	(0.00331)
D(GP)	0.225451	0.005162
	(0.10442)	(0.01323)
D(IP)	0.003049	0.001333
	(0.00658)	(0.00083)
D(IR)	1.57E-05	1.52E-05
	(6.6E-05)	(8.3E-06)
D(KSE_INDEX)	-0.591808	-0.072688
	(0.10858)	(0.01376)
D(MS)	-18.40249	-2.549827
	(11.2692)	(1.42826)
D(OP)	0.001851	0.000217
	(0.00345)	(0.00044)
D(PI)	-8.89E-05	3.67E-06
	(0.00023)	(2.9E-05)
D(WR)	0.006628	0.000781
	(0.00871)	(0.00110)
D(XR)	0.000147	2.72E-05
	(0.00013)	(1.7E-05)

3 Cointegrating Equation(s): Log likelihood -6106.053

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.000000	0.000000	0.372037	40.91027	128.0141	-1.686801	-0.016361	38.24385	15.46420	10.18497	-390.4695	622.5260
			(0.34488)	(5.82245)	(213.570)	(0.39266)	(0.00606)	(12.5667)	(194.472)	(6.80552)	(323.579)	(169.978)
0.000000	1.000000	0.000000	-7.240568	-402.1655	-1170.647	14.09424	0.144130	-598.3326	-138.6226	-78.36825	8600.512	-7440.756
			(3.78055)	(63.8258)	(2341.16)	(4.30431)	(0.06644)	(137.757)	(2131.80)	(74.6021)	(3547.08)	(1863.30)
0.000000	0.000000	1.000000	-0.125422	-2.626728	-66.36217	0.161228	0.000423	-5.743488	27.99998	-0.393492	121.8747	-57.49106
			(0.03501)	(0.59104)	(21.6797)	(0.03986)	(0.00062)	(1.27566)	(19.7410)	(0.69083)	(32.8469)	(17.2547)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.152650	-0.010946	-0.130266
	(0.08084)	(0.01009)	(0.55456)
D(EX)	-0.636820	-0.072037	5.305292
	(1.49836)	(0.18694)	(10.2785)
D(FDI)	0.079595	0.011679	-0.627297
	(0.02794)	(0.00349)	(0.19168)
D(GP)	0.080661	-0.011619	2.836955
	(0.10712)	(0.01336)	(0.73485)
D(IP)	-0.002232	0.000721	-0.035103
	(0.00713)	(0.00089)	(0.04889)
D(IR)	-0.000123	-9.24E-07	0.000318
	(5.9E-05)	(7.4E-06)	(0.00041)
D(KSE_INDEX)	-0.604352	-0.074142	1.982410
	(0.12054)	(0.01504)	(0.82689)
D(MS)	-23.84114	-3.180185	141.9759
	(12.4048)	(1.54763)	(85.0948)
D(OP)	-0.000167	-1.67E-05	0.017161
	(0.00378)	(0.00047)	(0.02590)
D(PI)	-8.07E-05	4.62E-06	-0.001080
	(0.00025)	(3.2E-05)	(0.00175)
D(WR)	0.003134	0.000376	0.020408
	(0.00962)	(0.00120)	(0.06597)

D(XR)	0.000133	2.55E-05	-0.001091
	(0.00015)	(1.8E-05)	(0.00101)

4 Cointegrating Equation(s): Log likelihood -6070.787

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.000000	0.000000	0.000000	30.48653	71.63260	-1.056261	-0.015430	32.70092	110.6579	9.308444	-103.9361	441.4336
				(4.61312)	(160.650)	(0.29908)	(0.00482)	(9.01155)	(107.475)	(5.40826)	(250.556)	(122.791)
0.000000	1.000000	0.000000	0.000000	-199.2992	-73.35388	1.822710	0.126025	-490.4564	-1991.277	-61.30925	3024.016	-3916.347
				(40.1795)	(1399.23)	(2.60491)	(0.04195)	(78.4891)	(936.090)	(47.1051)	(2182.30)	(1069.49)
0.000000	0.000000	1.000000	0.000000	0.887343	-47.35473	-0.051341	0.000109	-3.874845	-4.091907	-0.097995	25.27798	3.559134
				(0.41206)	(14.3498)	(0.02671)	(0.00043)	(0.80494)	(9.60007)	(0.48309)	(22.3806)	(10.9682)
0.000000	0.000000	0.000000	1.000000	28.01800	151.5480	-1.694829	-0.002501	14.69886	-255.8715	2.356030	-770.1739	486.7587
				(4.82194)	(167.922)	(0.31261)	(0.00503)	(9.41947)	(112.340)	(5.65308)	(261.898)	(128.350)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.141089	-0.006953	-0.043924	0.062038
	(0.08159)	(0.01115)	(0.56124)	(0.04661)
D(EX)	-0.234590	0.066882	8.309301	0.427678
	(1.48916)	(0.20345)	(10.2437)	(0.85080)
D(FDI)	0.078226	0.011206	-0.637519	0.020977
	(0.02835)	(0.00387)	(0.19502)	(0.01620)
D(GP)	0.079343	-0.012075	2.827108	-0.244325
	(0.10876)	(0.01486)	(0.74812)	(0.06214)
D(IP)	-0.003949	0.000128	-0.047928	-0.005100
	(0.00711)	(0.00097)	(0.04893)	(0.00406)
D(IR)	-0.000131	-3.56E-06	0.000281	-9.44E-05
	(6.0E-05)	(8.2E-06)	(0.00041)	(3.4E-05)
D(KSE_INDEX)	-0.610121	-0.076134	1.939328	0.051756
	(0.12230)	(0.01671)	(0.84130)	(0.06987)
D(MS)	-25.31889	-3.690559	130.9395	-6.620326
	(12.5426)	(1.71359)	(86.2778)	(7.16591)
D(OP)	0.002819	0.001015	0.039468	0.003909

	(0.00306)	(0.00042)	(0.02106)	(0.00175)
D(PI)	-0.000140	-1.59E-05	-0.001524	-4.73E-05
	(0.00025)	(3.5E-05)	(0.00175)	(0.00015)
D(WR)	0.002898	0.000294	0.018645	-0.004589
	(0.00976)	(0.00133)	(0.06715)	(0.00558)
D(XR)	0.000210	5.21E-05	-0.000516	0.000156
	(0.00014)	(1.9E-05)	(0.00094)	(7.8E-05)

5 Cointegrating Equation(s): Log likelihood -6039.468

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.000000	0.000000	0.000000	0.000000	-454.6461	-0.114232	0.007270	-158.2840	-299.6367	19.41237	1458.759	-236.8441
					(421.434)	(0.89890)	(0.01462)	(26.7377)	(320.656)	(16.3679)	(758.105)	(367.257)
0.000000	1.000000	0.000000	0.000000	0.000000	3367.082	-4.335608	-0.022373	758.0674	690.9366	-127.3615	-7191.775	517.7498
					(2464.52)	(5.25672)	(0.08549)	(156.361)	(1875.18)	(95.7186)	(4433.36)	(2147.70)
0.000000	0.000000	1.000000	0.000000	0.000000	-62.67263	-0.023922	0.000770	-9.433666	-16.03397	0.196091	70.76190	-16.18286
					(23.5940)	(0.05032)	(0.00082)	(1.49691)	(17.9519)	(0.91636)	(42.4425)	(20.5609)
0.000000	0.000000	0.000000	1.000000	0.000000	-332.1174	-0.829077	0.018362	-160.6218	-632.9441	11.64183	665.9884	-136.5981
					(439.683)	(0.93782)	(0.01525)	(27.8955)	(334.541)	(17.0767)	(790.932)	(383.160)
0.000000	0.000000	0.000000	0.000000	1.000000	17.26266	-0.030900	-0.000745	6.264569	13.45823	-0.331423	-51.25856	22.24844
					(14.7480)	(0.03146)	(0.00051)	(0.93568)	(11.2213)	(0.57279)	(26.5298)	(12.8521)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.129842	-0.004408	0.183190	0.058346	-0.950724
	(0.08495)	(0.01240)	(0.74318)	(0.04720)	(1.27477)
D(EX)	-0.228776	0.068197	8.426689	0.425770	-0.988164
	(1.55346)	(0.22673)	(13.5905)	(0.86309)	(23.3118)
D(FDI)	0.056035	0.006185	-1.085640	0.028261	-0.350619
	(0.02768)	(0.00404)	(0.24216)	(0.01538)	(0.41537)
D(GP)	0.052279	-0.018199	2.280588	-0.235442	-0.150740
	(0.11274)	(0.01645)	(0.98631)	(0.06264)	(1.69181)
D(IP)	-0.004083	9.78E-05	-0.050619	-0.005056	-0.334454
	(0.00742)	(0.00108)	(0.06492)	(0.00412)	(0.11135)

D(IR)	-0.000115	6.99E-08	0.000585	-9.96E-05	-0.005314
	(6.2E-05)	(9.0E-06)	(0.00054)	(3.4E-05)	(0.00093)
D(KSE_INDEX)	-0.686774	-0.093478	0.391421	0.076916	-2.066593
	(0.12241)	(0.01787)	(1.07088)	(0.06801)	(1.83687)
D(MS)	-23.85025	-3.358251	160.5969	-7.102394	-70.97019
	(13.0659)	(1.90702)	(114.309)	(7.25939)	(196.072)
D(OP)	0.000422	0.000472	-0.008941	0.004696	-0.028372
	(0.00299)	(0.00044)	(0.02614)	(0.00166)	(0.04484)
D(PI)	-0.000312	-5.47E-05	-0.004993	9.09E-06	-0.007840
	(0.00025)	(3.7E-05)	(0.00221)	(0.00014)	(0.00379)
D(WR)	0.001565	-7.22E-06	-0.008269	-0.004152	-0.113823
	(0.01016)	(0.00148)	(0.08892)	(0.00565)	(0.15253)
D(XR)	0.000316	7.62E-05	0.001633	0.000121	0.002445
	(0.00013)	(2.0E-05)	(0.00117)	(7.4E-05)	(0.00201)

6 Cointegrating Equation(s): Log likelihood -6013.064

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.960436	0.013222	31.04590	398.8995	-103.3719	-71.66733	-963.5692
						(1.75821)	(0.02444)	(55.3867)	(526.258)	(31.1320)	(1300.26)	(518.224)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	-19.70047	-0.066454	-644.0988	-4482.380	781.9712	4142.473	5899.833
						(13.6398)	(0.18957)	(429.677)	(4082.59)	(241.515)	(10087.1)	(4020.26)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.262069	0.001590	16.66533	80.25873	-16.72963	-140.2063	-116.3614
						(0.29454)	(0.00409)	(9.27859)	(88.1608)	(5.21535)	(217.825)	(86.8149)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.686460	0.022710	-22.31699	-122.6659	-78.05162	-451.9828	-667.4682
						(1.20977)	(0.01681)	(38.1098)	(362.101)	(21.4209)	(894.668)	(356.573)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	-0.109674	-0.000971	-0.924185	-13.06481	4.330628	6.850907	49.84180
						(0.07244)	(0.00101)	(2.28189)	(21.6814)	(1.28261)	(53.5697)	(21.3504)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.004563	1.31E-05	0.416434	1.536439	-0.270066	-3.366193	-1.598441
						(0.00517)	(7.2E-05)	(0.16289)	(1.54768)	(0.09156)	(3.82396)	(1.52405)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.129926	-0.009939	0.208524	0.061201	-0.518418	-12.50278

	(0.08443)	(0.01401)	(0.73927)	(0.04703)	(1.36976)	(36.4869)
D(EX)	-0.233658	-0.256157	9.912323	0.593178	24.36320	-905.4249
	(1.45304)	(0.24107)	(12.7229)	(0.80947)	(23.5736)	(627.940)
D(FDI)	0.056007	0.004329	-1.077141	0.029219	-0.205592	44.78957
	(0.02750)	(0.00456)	(0.24080)	(0.01532)	(0.44616)	(11.8846)
D(GP)	0.052594	0.002711	2.184815	-0.246234	-1.785042	-116.7668
	(0.10703)	(0.01776)	(0.93716)	(0.05963)	(1.73642)	(46.2536)
D(IP)	-0.004059	0.001640	-0.057681	-0.005852	-0.454966	3.889626
	(0.00695)	(0.00115)	(0.06081)	(0.00387)	(0.11268)	(3.00151)
D(IR)	-0.000115	-9.18E-06	0.000627	-9.48E-05	-0.004591	-0.058603
	(6.0E-05)	(9.9E-06)	(0.00052)	(3.3E-05)	(0.00097)	(0.02584)
D(KSE_INDEX)	-0.686686	-0.087664	0.364788	0.073915	-2.521068	-78.35718
	(0.12201)	(0.02024)	(1.06831)	(0.06797)	(1.97943)	(52.7267)
D(MS)	-23.86309	-4.211371	164.5044	-6.662074	-4.290682	-10848.55
	(12.9858)	(2.15444)	(113.704)	(7.23420)	(210.677)	(5611.87)
D(OP)	0.000417	0.000131	-0.007377	0.004872	-0.001690	-0.671828
	(0.00293)	(0.00049)	(0.02567)	(0.00163)	(0.04756)	(1.26699)
D(PI)	-0.000312	-3.37E-05	-0.005089	-1.76E-06	-0.009483	0.167768
	(0.00025)	(4.2E-05)	(0.00219)	(0.00014)	(0.00406)	(0.10811)
D(WR)	0.001544	-0.001456	-0.001634	-0.003404	-0.000607	-3.271119
	(0.00986)	(0.00164)	(0.08637)	(0.00549)	(0.16003)	(4.26269)
D(XR)	0.000316	9.99E-05	0.001524	0.000109	0.000590	0.052752
	(0.00013)	(2.1E-05)	(0.00112)	(7.1E-05)	(0.00207)	(0.05527)

7 Cointegrating Equation(s): Log likelihood -5992.280

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.023119	15.13082	144.6016	-73.35145	-198.6314	-857.7183
							(0.01071)	(30.6370)	(304.858)	(16.3283)	(528.554)	(283.190)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.165916	-484.1677	-1926.933	480.2951	5418.338	4836.134
							(0.07268)	(207.924)	(2068.97)	(110.815)	(3587.13)	(1921.92)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.002913	14.53782	46.26445	-12.71653	-157.1787	-102.2114
							(0.00200)	(5.72293)	(56.9469)	(3.05009)	(98.7328)	(52.8993)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.026175	-27.88977	-211.7101	-67.53976	-496.4402	-630.4038

							(0.00981)	(28.0728)	(279.342)	(14.9616)	(484.315)	(259.487)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	-0.001524	-0.033838	1.161535	2.651177	13.95373	43.92011
							(0.00037)	(1.04612)	(10.4096)	(0.55754)	(18.0478)	(9.66970)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	3.61E-05	0.379389	0.944516	-0.200188	-3.661724	-1.352055
							(3.6E-05)	(0.10300)	(1.02490)	(0.05489)	(1.77695)	(0.95206)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-0.005049	8.118134	129.7150	-15.31314	64.76318	-53.99357
							(0.00504)	(14.4322)	(143.609)	(7.69175)	(248.986)	(133.402)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.147449	-0.016295	-0.058133	0.039988	-0.597399	-13.90508	0.158445
	(0.08382)	(0.01446)	(0.74958)	(0.04851)	(1.34647)	(35.8498)	(0.13669)
D(EX)	0.115744	-0.129441	15.22912	1.016142	25.93798	-877.4647	-1.620682
	(1.43352)	(0.24722)	(12.8192)	(0.82965)	(23.0271)	(613.095)	(2.33768)
D(FDI)	0.048741	0.001694	-1.187698	0.020424	-0.238338	44.20817	0.039333
	(0.02699)	(0.00465)	(0.24137)	(0.01562)	(0.43357)	(11.5437)	(0.04402)
D(GP)	0.054909	0.003551	2.220037	-0.243432	-1.774609	-116.5816	0.100204
	(0.10817)	(0.01865)	(0.96729)	(0.06260)	(1.73754)	(46.2620)	(0.17639)
D(IP)	-0.003367	0.001891	-0.047148	-0.005014	-0.451846	3.945021	0.003479
	(0.00699)	(0.00121)	(0.06253)	(0.00405)	(0.11231)	(2.99037)	(0.01140)
D(IR)	-0.000124	-1.23E-05	0.000495	-0.000105	-0.004630	-0.059300	0.000351
	(6.0E-05)	(1.0E-05)	(0.00054)	(3.5E-05)	(0.00096)	(0.02562)	(9.8E-05)
D(KSE_INDEX)	-0.666646	-0.080396	0.669730	0.098174	-2.430747	-76.75354	0.307842
	(0.12196)	(0.02103)	(1.09060)	(0.07058)	(1.95905)	(52.1595)	(0.19888)
D(MS)	-25.54374	-4.820885	138.9302	-8.696562	-11.86547	-10983.04	37.28146
	(13.0359)	(2.24811)	(116.573)	(7.54452)	(209.400)	(5575.26)	(21.2580)
D(OP)	0.000397	0.000124	-0.007688	0.004848	-0.001782	-0.673462	-0.003092
	(0.00296)	(0.00051)	(0.02650)	(0.00172)	(0.04760)	(1.26743)	(0.00483)
D(PI)	-0.000220	-4.93E-07	-0.003694	0.000109	-0.009069	0.175103	-0.000108
	(0.00024)	(4.1E-05)	(0.00213)	(0.00014)	(0.00383)	(0.10202)	(0.00039)
D(WR)	0.007029	0.000534	0.081841	0.003237	0.024118	-2.832135	-0.023762
	(0.00861)	(0.00149)	(0.07702)	(0.00498)	(0.13836)	(3.68379)	(0.01405)
D(XR)	0.000344	0.000110	0.001946	0.000143	0.000715	0.054973	-0.000889
	(0.00013)	(2.2E-05)	(0.00113)	(7.3E-05)	(0.00204)	(0.05421)	(0.00021)

8 Cointegrating Equation(s): Log likelihood -5973.565

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-100.6364	52.08705	-51.98811	412.5737	-35.50403
								(27.8284)	(223.665)	(15.9602)	(467.703)	(136.747)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	346.6289	-1263.009	326.9825	1032.062	-1064.437
								(145.055)	(1165.85)	(83.1921)	(2437.89)	(712.787)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.049588	34.60703	-10.02461	-80.16301	1.392850
								(4.64186)	(37.3080)	(2.66221)	(78.0141)	(22.8097)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	-158.9586	-316.4527	-43.35272	195.5512	300.4870
								(38.6939)	(310.994)	(22.1918)	(650.315)	(190.139)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	7.598884	7.261167	1.242658	-26.34401	-10.28981
								(1.55210)	(12.4747)	(0.89017)	(26.0857)	(7.62691)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.198472	0.799938	-0.166802	-2.706557	-0.067131
								(0.07742)	(0.62228)	(0.04440)	(1.30125)	(0.38046)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	33.39878	149.9179	-19.97835	-68.70859	-233.5444
								(14.1939)	(114.081)	(8.14055)	(238.553)	(69.7479)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	5007.343	4001.580	-924.0398	-26436.78	-35563.68
								(1316.50)	(10581.1)	(755.044)	(22126.0)	(6469.20)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.157038	-0.012686	0.177436	0.050106	-0.624659	-29.32680	0.189420	6.69E-06
	(0.08396)	(0.01493)	(0.79108)	(0.04953)	(1.33761)	(39.6805)	(0.14024)	(0.00106)
D(EX)	0.217748	-0.167829	12.72309	0.908497	26.22798	-713.4055	-1.950199	0.029648
	(1.44191)	(0.25642)	(13.5862)	(0.85068)	(22.9723)	(681.481)	(2.40854)	(0.01827)
D(FDI)	0.059547	-0.002372	-1.453180	0.009021	-0.207616	61.58813	0.004425	-0.000573
	(0.02484)	(0.00442)	(0.23406)	(0.01466)	(0.39577)	(11.7406)	(0.04149)	(0.00031)
D(GP)	0.042824	0.008099	2.516936	-0.230679	-1.808966	-136.0183	0.139243	-0.000952
	(0.10838)	(0.01927)	(1.02117)	(0.06394)	(1.72666)	(51.2218)	(0.18103)	(0.00137)
D(IP)	-0.003464	0.001927	-0.044775	-0.004912	-0.452120	3.789682	0.003791	0.000156
	(0.00705)	(0.00125)	(0.06644)	(0.00416)	(0.11233)	(3.33241)	(0.01178)	(8.9E-05)
D(IR)	-0.000118	-1.46E-05	0.000348	-0.000112	-0.004613	-0.049675	0.000331	8.73E-07
	(6.0E-05)	(1.1E-05)	(0.00057)	(3.5E-05)	(0.00096)	(0.02841)	(0.00010)	(7.6E-07)
D(KSE_INDEX)	-0.626891	-0.095358	-0.306985	0.056220	-2.317722	-12.81221	0.179414	0.000886
	(0.11598)	(0.02062)	(1.09280)	(0.06842)	(1.84777)	(54.8146)	(0.19373)	(0.00147)
D(MS)	-22.11347	-6.111853	54.65482	-12.31653	-2.113118	-5465.898	26.20011	-0.261585

	(12.6632)	(2.25193)	(119.317)	(7.47086)	(201.749)	(5984.95)	(21.1524)	(0.16047)
D(OP)	-2.56E-05	0.000283	0.002686	0.005293	-0.002983	-1.352576	-0.001728	9.71E-05
	(0.00296)	(0.00053)	(0.02786)	(0.00174)	(0.04711)	(1.39750)	(0.00494)	(3.7E-05)
D(PI)	-0.000266	1.68E-05	-0.002564	0.000158	-0.009200	0.101145	4.08E-05	8.88E-06
	(0.00024)	(4.2E-05)	(0.00222)	(0.00014)	(0.00376)	(0.11148)	(0.00039)	(3.0E-06)
D(WR)	0.006438	0.000756	0.096371	0.003861	0.022436	-3.783333	-0.021851	0.000392
	(0.00867)	(0.00154)	(0.08165)	(0.00511)	(0.13806)	(4.09544)	(0.01447)	(0.00011)
D(XR)	0.000358	0.000105	0.001600	0.000128	0.000755	0.077649	-0.000934	4.17E-06
	(0.00013)	(2.3E-05)	(0.00120)	(7.5E-05)	(0.00202)	(0.06003)	(0.00021)	(1.6E-06)

9 Cointegrating Equation(s): Log likelihood -5962.214

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-179.0896	77.39992	1200.940	-374.3900
									(337.838)	(23.6957)	(652.933)	(201.892)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-466.7512	-118.6775	-1683.361	102.8108
									(876.828)	(61.5000)	(1694.63)	(523.994)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	34.49312	-9.960857	-79.77454	1.225865
									(36.5925)	(2.56657)	(70.7217)	(21.8677)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-681.6039	161.0200	1440.802	-234.7947
									(596.879)	(41.8646)	(1153.58)	(356.696)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	24.71692	-8.527211	-85.87218	15.29889
									(32.3595)	(2.26967)	(62.5408)	(19.3381)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	1.255858	-0.421977	-4.261349	0.601209
									(1.59145)	(0.11162)	(3.07578)	(0.95106)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	226.6398	-62.91909	-330.3481	-121.0764
									(257.013)	(18.0267)	(496.725)	(153.591)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	15504.18	-7361.971	-65663.33	-18701.81
									(23547.0)	(1651.57)	(45509.0)	(14071.8)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-2.297147	1.285698	7.833805	-3.367428
									(5.40332)	(0.37898)	(10.4429)	(3.22904)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.155948	-0.013095	0.209619	0.055436	-0.705356	-25.80843	0.186317	-1.45E-05	-0.939125
	(0.08420)	(0.01514)	(0.81514)	(0.05934)	(1.42591)	(45.1585)	(0.14149)	(0.00107)	(2.81382)
D(EX)	0.308887	-0.201990	15.41379	1.354152	19.48101	-419.2418	-2.209612	0.027880	-97.84924
	(1.43832)	(0.25854)	(13.9238)	(1.01353)	(24.3565)	(771.369)	(2.41690)	(0.01830)	(48.0639)
D(FDI)	0.060040	-0.002557	-1.438626	0.011431	-0.244112	63.17933	0.003022	-0.000582	-0.326387
	(0.02491)	(0.00448)	(0.24111)	(0.01755)	(0.42176)	(13.3571)	(0.04185)	(0.00032)	(0.83228)
D(GP)	0.029862	0.012957	2.134253	-0.294062	-0.849383	-177.8556	0.176138	-0.000700	-3.859526
	(0.10651)	(0.01914)	(1.03107)	(0.07505)	(1.80362)	(57.1205)	(0.17897)	(0.00136)	(3.55917)
D(IP)	-0.002151	0.001435	-0.006020	0.001507	-0.549299	8.026615	5.44E-05	0.000130	-0.174886
	(0.00672)	(0.00121)	(0.06505)	(0.00473)	(0.11378)	(3.60349)	(0.01129)	(8.6E-05)	(0.22453)
D(IR)	-0.000124	-1.23E-05	0.000165	-0.000142	-0.004157	-0.069593	0.000349	9.92E-07	-0.004017
	(5.9E-05)	(1.1E-05)	(0.00058)	(4.2E-05)	(0.00101)	(0.03186)	(0.00010)	(7.6E-07)	(0.00198)
D(KSE_INDEX)	-0.621406	-0.097413	-0.145049	0.083041	-2.723779	4.891653	0.163801	0.000780	10.55895
	(0.11598)	(0.02085)	(1.12275)	(0.08173)	(1.96401)	(62.1999)	(0.19489)	(0.00148)	(3.87567)
D(MS)	-22.44408	-5.987933	44.89414	-13.93317	22.36192	-6532.995	27.14114	-0.255173	576.1948
	(12.6911)	(2.28124)	(122.858)	(8.94296)	(214.913)	(6806.25)	(21.3258)	(0.16150)	(424.097)
D(OP)	-2.82E-05	0.000284	0.002610	0.005281	-0.002791	-1.360925	-0.001721	9.72E-05	-0.603171
	(0.00297)	(0.00053)	(0.02872)	(0.00209)	(0.05023)	(1.59081)	(0.00498)	(3.8E-05)	(0.09912)
D(PI)	-0.000300	2.97E-05	-0.003577	-1.01E-05	-0.006660	-0.009621	0.000139	9.54E-06	0.008791
	(0.00023)	(4.1E-05)	(0.00222)	(0.00016)	(0.00389)	(0.12306)	(0.00039)	(2.9E-06)	(0.00767)
D(WR)	0.006567	0.000708	0.100173	0.004490	0.012903	-3.367660	-0.022218	0.000389	-0.371229
	(0.00869)	(0.00156)	(0.08412)	(0.00612)	(0.14716)	(4.66048)	(0.01460)	(0.00011)	(0.29039)
D(XR)	0.000348	0.000108	0.001300	7.83E-05	0.001507	0.044870	-0.000906	4.37E-06	-0.007831
	(0.00013)	(2.3E-05)	(0.00122)	(8.9E-05)	(0.00214)	(0.06771)	(0.00021)	(1.6E-06)	(0.00422)

10 Cointegrating Equation(s): Log likelihood -5953.375

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	19.44941	460.7396	-220.2460
										(9.00896)	(81.6069)	(41.1871)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-269.7107	-3612.504	504.5475
										(92.5074)	(837.970)	(422.925)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.200564	62.78997	-28.46266
										(1.51562)	(13.7291)	(6.92909)

0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-59.53609	-1376.355	351.8676
										(27.8757)	(252.510)	(127.442)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.529213	16.28602	-5.975173
										(0.80755)	(7.31511)	(3.69195)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	-0.015602	0.929273	-0.479718
										(0.04642)	(0.42053)	(0.21224)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	10.41790	606.3832	-316.1472
										(9.19737)	(83.3136)	(42.0485)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	-2345.066	-1582.556	-32046.39
										(640.674)	(5803.48)	(2929.03)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.542378	-1.660597	-1.390255
										(0.17931)	(1.62424)	(0.81976)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-0.323584	-4.133129	0.860709
										(0.08621)	(0.78090)	(0.39412)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.197412	-0.011609	0.175932	0.037158	-0.360076	-50.32651	0.209812	0.000523	-1.202726	-5.141141
	(0.09400)	(0.01509)	(0.80926)	(0.06185)	(1.45917)	(51.5413)	(0.14245)	(0.00120)	(2.80432)	(27.1098)
D(EX)	0.382487	-0.204627	15.47358	1.386597	18.86813	-375.7214	-2.251315	0.026926	-97.38134	-235.8902
	(1.61862)	(0.25988)	(13.9356)	(1.06501)	(25.1273)	(887.553)	(2.45305)	(0.02068)	(48.2910)	(466.837)
D(FDI)	0.053982	-0.002340	-1.443547	0.008761	-0.193666	59.59721	0.006454	-0.000504	-0.364899	-1.688827
	(0.02798)	(0.00449)	(0.24085)	(0.01841)	(0.43428)	(15.3399)	(0.04240)	(0.00036)	(0.83463)	(8.06849)
D(GP)	-0.007638	0.014301	2.103787	-0.310593	-0.537118	-200.0292	0.197386	-0.000214	-4.097922	53.56868
	(0.11937)	(0.01917)	(1.02774)	(0.07854)	(1.85312)	(65.4565)	(0.18091)	(0.00153)	(3.56143)	(34.4289)
D(IP)	0.002364	0.001273	-0.002352	0.003497	-0.586897	10.69640	-0.002504	7.19E-05	-0.146183	-2.259868
	(0.00745)	(0.00120)	(0.06411)	(0.00490)	(0.11561)	(4.08344)	(0.01129)	(9.5E-05)	(0.22218)	(2.14781)
D(IR)	-0.000150	-1.13E-05	0.000144	-0.000153	-0.003941	-0.084921	0.000364	1.33E-06	-0.004182	0.042069
	(8.6E-05)	(1.1E-05)	(0.00057)	(4.4E-05)	(0.00103)	(0.03642)	(0.00010)	(8.5E-07)	(0.00198)	(0.01916)
D(KSE_INDEX)	-0.687647	-0.095040	-0.198865	0.053840	-2.172171	-34.27763	0.201336	0.001639	10.13783	54.22849
	(0.12910)	(0.02073)	(1.11146)	(0.08494)	(2.00408)	(70.7887)	(0.19565)	(0.00165)	(3.85155)	(37.2336)
D(MS)	-6.159400	-6.571447	58.12432	-6.754396	-113.2441	3096.286	17.91384	-0.466335	679.7221	12234.33
	(13.4729)	(2.16317)	(115.995)	(8.86478)	(209.152)	(7387.71)	(20.4184)	(0.17214)	(401.959)	(3885.80)
D(OP)	-5.09E-05	0.000284	0.002591	0.005271	-0.002602	-1.374383	-0.001708	9.75E-05	-0.603316	-2.914296
	(0.00334)	(0.00054)	(0.02874)	(0.00220)	(0.05182)	(1.83057)	(0.00506)	(4.3E-05)	(0.09960)	(0.96285)
D(PI)	-0.000206	2.63E-05	-0.003501	3.15E-05	-0.007444	0.046112	8.51E-05	8.32E-06	0.009390	-0.087480
	(0.00026)	(4.1E-05)	(0.00221)	(0.00017)	(0.00399)	(0.14080)	(0.00039)	(3.3E-06)	(0.00766)	(0.07406)
D(WR)	0.009241	0.000612	0.102345	0.005669	-0.009365	-1.786457	-0.023733	0.000355	-0.354229	-2.977278

	(0.00975)	(0.00157)	(0.08394)	(0.00641)	(0.15135)	(5.34588)	(0.01478)	(0.00012)	(0.29086)	(2.81184)
D(XR)	0.000350	0.000108	0.001302	7.93E-05	0.001488	0.046208	-0.000907	4.34E-06	-0.007817	-0.147241
	(0.00014)	(2.3E-05)	(0.00122)	(9.3E-05)	(0.00221)	(0.07792)	(0.00022)	(1.8E-06)	(0.00424)	(0.04098)

11 Cointegrating Equation(s): Log likelihood -5947.935

Normalized cointegrating coefficients (standard error in parentheses)

RPT_DS	EX	FDI	GP	IP	IR	KSE_INDEX	MS	OP	PI	WR	XR	@TREND(2)
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	384.7306	-191.2590
											(32.5291)	(11.7387)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-2558.465	102.5755
											(573.621)	(207.001)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	58.09812	-26.67336
											(12.8581)	(4.64007)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-1143.686	263.1361
											(256.449)	(92.5440)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	18.35420	-6.763902
											(5.83298)	(2.10493)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.990244	-0.502970
											(0.35076)	(0.12658)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	565.6697	-300.6206
											(82.8760)	(29.9072)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	7582.040	-35541.43
											(6055.71)	(2185.31)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	-3.780229	-0.581904
											(0.71007)	(0.25624)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	-2.868551	0.378445
											(0.75948)	(0.27407)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	3.908034	-1.490382
											(2.98887)	(1.07858)

Adjustment coefficients (standard error in parentheses)

D(RPT_DS)	-0.218856	-0.008607	-0.024389	0.017742	-0.776134	4.023198	0.213886	-0.000441	-1.346499	21.59259	-0.700547
	(0.09353)	(0.01497)	(0.80704)	(0.06224)	(1.46230)	(63.2659)	(0.13994)	(0.00136)	(2.75615)	(32.5171)	(1.50681)

D(EX)	0.781189	-0.260438	19.19798	1.747581	26.60355	-1386.200	-2.327054	0.044860	-94.70829	-732.9279	-51.13567
	(1.60564)	(0.25700)	(13.8552)	(1.06849)	(25.1047)	(1086.14)	(2.40249)	(0.02332)	(47.3173)	(558.251)	(25.8688)
D(FDI)	0.052976	-0.002199	-1.452945	0.007850	-0.213184	62.14678	0.006645	-0.000549	-0.371644	-0.434737	0.152720
	(0.02833)	(0.00453)	(0.24445)	(0.01885)	(0.44292)	(19.1628)	(0.04239)	(0.00041)	(0.83482)	(9.84918)	(0.45640)
D(GP)	-0.024546	0.016668	1.945844	-0.325901	-0.865161	-157.1769	0.200598	-0.000975	-4.211280	74.64701	2.679559
	(0.12011)	(0.01922)	(1.03640)	(0.07993)	(1.87789)	(81.2459)	(0.17971)	(0.00174)	(3.53944)	(41.7584)	(1.93504)
D(IP)	0.002209	0.001295	-0.003802	0.003357	-0.589910	11.09002	-0.002474	6.49E-05	-0.147224	-2.066252	0.085798
	(0.00754)	(0.00121)	(0.06509)	(0.00502)	(0.11794)	(5.10257)	(0.01129)	(0.00011)	(0.22229)	(2.62260)	(0.12153)
D(IR)	-0.000146	-1.18E-05	0.000177	-0.000150	-0.003873	-0.093768	0.000363	1.49E-06	-0.004158	0.037717	-0.002197
	(6.7E-05)	(1.1E-05)	(0.00058)	(4.5E-05)	(0.00105)	(0.04548)	(0.00010)	(9.8E-07)	(0.00198)	(0.02337)	(0.00108)
D(KSE_INDEX)	-0.684937	-0.095419	-0.173542	0.056295	-2.119576	-41.14814	0.200821	0.001761	10.15601	50.84900	-3.176476
	(0.13076)	(0.02093)	(1.12837)	(0.08702)	(2.04453)	(88.4557)	(0.19566)	(0.00190)	(3.85353)	(45.4641)	(2.10676)
D(MS)	-7.679833	-6.358617	43.92150	-8.130994	-142.7428	6949.703	18.20267	-0.534726	669.5286	14129.76	-240.2521
	(13.5898)	(2.17523)	(117.267)	(9.04349)	(212.480)	(9192.88)	(20.3342)	(0.19736)	(400.483)	(4724.91)	(218.948)
D(OP)	-0.000284	0.000317	0.000414	0.005060	-0.007124	-0.783636	-0.001664	8.70E-05	-0.604879	-2.623717	-0.006291
	(0.00338)	(0.00054)	(0.02914)	(0.00225)	(0.05279)	(2.28399)	(0.00505)	(4.9E-05)	(0.09950)	(1.17392)	(0.05440)
D(PI)	-0.000172	2.15E-05	-0.003180	6.26E-05	-0.006777	-0.041023	7.86E-05	9.87E-06	0.009621	-0.130340	0.002325
	(0.00026)	(4.1E-05)	(0.00223)	(0.00017)	(0.00404)	(0.17490)	(0.00039)	(3.8E-06)	(0.00762)	(0.08989)	(0.00417)
D(WR)	0.007563	0.000847	0.086674	0.004150	-0.041913	2.465293	-0.023414	0.000279	-0.365476	-0.885911	-0.548456
	(0.00978)	(0.00156)	(0.08437)	(0.00651)	(0.15286)	(6.61359)	(0.01463)	(0.00014)	(0.28812)	(3.39922)	(0.15752)
D(XR)	0.000354	0.000108	0.001338	8.28E-05	0.001562	0.036532	-0.000908	4.51E-06	-0.007791	-0.152000	-0.003134
	(0.00014)	(2.3E-05)	(0.00124)	(9.6E-05)	(0.00225)	(0.09736)	(0.00022)	(2.1E-06)	(0.00424)	(0.05004)	(0.00232)