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Size, Value and Momentum in Pakistan Equity Market: Size and Liquidity Exposures

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Abstract *The study inspects the size and liquidity pattern in Pakistan equity market. Sample size contains 278 non-financial firm's monthly data listed on Pakistan Stock Exchange (PSX) from 2001 to 2012. This study uses three asset pricing models (eq.5), (eq.6) and (eq.7). Four factors asset pricing model estimates that momentum factor is positively and negatively linked with winner and loser stocks, both in size and liquidity patterns. Although it is observed that the presence of size and liquidity does not affect the coefficient results but average value of momentum premium in larger in liquidity than size pattern. Further, the study reveals high average stock returns on momentum strategy in liquidity pattern than size that is 8.05% Vs 6.67%, respectively. Results of this study contradicts Fama & French (2012) who concluded that size pattern in momentum factor outperform the equity market. But this study conclude that liquidity pattern outperforms the size pattern in momentum factor. This study raises the question that should investors and academicians consider size or liquidity pattern in momentum factor for high returns and future research?*

Key Words:

Size, Liquidity, Momentum premium, Asset Pricing Model

Introduction

The Capital Asset Pricing Model (CAPM) anomalies are considered a striking zone of predicting required rate of returns in equity market. The Capital Asset Pricing Model (Sharpe, 1964) base on the assumption of efficient market hypothesis where he trusts that only systematic risk factor is enough to estimate the required rate of stock returns. Whereas, Fama in 1970's examined this efficient market hypothesis (EMH) which result in lot of differentiations as described by CAPM. Such critique allows other researchers to explore other risk factors than market risk only. As a result, several vital risk factors created which can beat the market that is P/E ratio (Basu, 1977), book-to-market ratio

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(Stattman, 1980), size (Banz, 1981), liquidity (Amihud & Mendelson, 1986), leverage (Bhandari, 1988) and momentum effect (Jagadeesh & Titman, 1993).

Focus of this study is to evaluate the investment strategies based on size and liquidity pattern while considering the CAPM, Fama & French three factors and Carhart four factors model. First phase of the study is evaluating the momentum effect on size bases that is small and big firms. Second phase of the study is evaluating the momentum effect on liquidity bases that is high and low liquid stocks. Moreover, it also estimates that up to how much degree Fama & French three factors and Carhart four factors explain portfolio returns built on size to value, size to momentum and liquidity to momentum. Our study is based on Fama & French (2012), their study focusses on size pattern in examining the value and momentum effect in worldwide equity market. Same nature of studies is conducted in Europe, Japan, North America, emerging markets and developed equity markets of Asia Pacific by Rouwenhorst (1998), Cakici, Fabozzi & Tan (2013) and Cakici and Tan (2014).

This study is conducted in Pakistan Stock Exchange (PSX) which is one of the famous equity markets of Asia. PSX is ignored; one of reason of ignoring PSX is the absence of easy accessibility to complete data. This study not only considers size but also experience the liquidity pattern in momentum factor in Pakistan equity market. It is the major contribution of this study. This study recommends that momentum is linked to liquidity, the positive relation among momentum and risk adjusted stock returns is because of the positive relation among momentum and low liquidity of stock. Sadka (2006) says that momentum returns are rewarded for illiquid risk. Subrahmanyam (2005) argues that the relationship of stock turnover and share prices rest on the past tendency of share prices. Investors ask high returns for low liquidity risk, shares with high returns in prior year have positive relationship with share turnover and vice versa.

This study is organized as follows. The second section presents brief literature review, third section discuss the descriptions of data, variables constructions and models for statistical analysis and fourth section discuss the empirical finding of this study while last session concludes the study.

Literature Review

Banz (1981), primarily conducted a study in US equity market by considering the size effect. He measures the size of firm by market value and differentiates the small firms (low market value) from big firms (high market value). Their study concluded that a firm with low market value (small) outperformed than a firm with high market value (big). In other words, small firm earns high risk adjusted average returns. Stattman (1980), DeBondt and Thaler (1985), Lakonishok & Vishny (1994) conducted study in US equity market and concluded that the firms with high book to market ratio (value stocks) earned high average returns than

the firm with low book to market ratio (growth stocks). The most prominent work is done by Fama and French (1993). This study added two asset pricing factors of size and value in addition to market factor to explain the stock returns. Their study construct size premium (SMB) and value premium (HML) and concluded that size is negatively, and value is positively associated with average stock returns. But Fama and French (1996), mentioned that Fama and French (1993) three factor model fail to continuously explain short-turn returns. Schwert (2003) argued that most empirically significant CAPM anomalies such as size and value factor vanished but momentum anomaly never disappeared. Jegadeesh and Titman (1993), first time documented that the firm performing good from previous three to twelve months outperform the firm performing bad from previous three to twelve months. The firm performing good is termed as winners and firm performing badly is termed as losers. The investors investing in winner's firm and selling out loser's firm can earn abnormal profit. The application of this strategy again refused the EMH (Subrahmanyam, 2005; Sadka, 2006; Cakici, Fabozzi & Tan, 2013; Ansari & Khan, 2012).

Data Description and Methodology

The sample size consists of monthly data of 278 non-financial firms listed at Pakistan Stock Exchange for the period of 2001 to 2012. The data of share prices and trading volume are collected from PSX website (www.psx.com.pk) and business recorder (www.brecorder.com.pk). Liquidity is measured by trading volume of stock. KSE-100 index data is collected from yahoo finance for the measurement of market returns. The Treasury bill rates are used as a proxy for the measurement of risk free return, its data is collected from the website of State Bank of Pakistan. Market value of equity and book-to- market equity ratio is use as a proxy for the measurement of size and value factor. For this purpose, data of outstanding shares and book equity is obtained from the financial reports of firms.

Portfolio and Risk Factors Construction

Portfolio approach is used to explore the relationship amongst the strategies sorted portfolio returns and four several risk factors i.e., market, size, value and momentum premium. This study follows methodology of Fama & French (2012) in construction of portfolios and risk factors.

Portfolio Construction

We construct six equal weighted portfolios for value factor from the intersection of two size and three value factors. These are S/V, S/N, S/G, B/V, B/N and B/G,

where V, N and G represent value, neutral and growth respectively and S and B represent small and big stocks. Further six equally weighted portfolios were momentum factor from the intersection of two size and three momentum factors. These are S/W, S/N, S/L, B/W, B/N and B/L, where W, N and L represent winner, neutral and loser respectively, while S and B represent small and big stocks. At last addition to Fama & French (2012), we constructed six equally weighted portfolios for momentum factor from the intersection of two liquidity and three momentum factors. These are I/W, I/N, I/L, l/W, l/N and l/L, where W, N and L represent winner, neutral and loser respectively and I and l present illiquid and liquid stocks.

Risk Factors Construction

For the measurement of size factor, the firms are rank and divided by 50:50 on the base of high and low market equity. The firms with low market equity are small (S) firms and the firms with high market equity are big (B) firms. To measure the market equity for single time, the closing price of share at June t is multiplied by the outstanding shares of specific firms at the end of June t. For the measurement of value factor, the firms are rank and divided as 30:40:30 on the base of book to market equity ratio. The firms with the top 30% (value) B/M ratio are consider high value stocks, middle 40% are consider neutral and last 30% (growth) are consider low value stocks. For the measurement of B/M ratio, the book value of equity at the end of June "t" was divided by the market value of equity at the of June "t" for each period. For the measurement of momentum factor, the firms are rank and divided into 30:40:30 on the base of previous year return from t-10 to t-1. Top 30% firms from previous year returns (t-10 to t-1) were considered winner stocks, middle 40% were neutral and last 30% were loser stocks. At last to measure the liquidity factor, the firms are rank and divided into 50:50 on the base of share turnover of each month at the end of June t. The firms with the top 50% were considered highly liquid stocks and last 50% was considered low liquid stocks.

Construction of Asset Pricing Factors

This study uses the CAPM, F-F (1993) three factor and Carhart (1997) four factor asset pricing models, for this purpose we constructed four explanatory risk factors. These factors are market premium (Rm-Rf), size premium (SMB), value premium (HML) and momentum premium (WML). We followed the Fama & French (2012) for the construction of the given risk factors, by sorting 2 into 3 on size and B/M ratio respectively, 2 into 3 on size and momentum. Respectively a part from Fama & French (2012) factors, this study constructed the momentum

factor by incorporating the liquidity factor instead of size by sorting 2 into 3 on liquidity and momentum respectively.

The size (SMB) factor is the difference of equal-weighted average returns on three (2 x 3) small stocks base on size and B/M ratio and equal-weighted average returns on three (2 x 3) big stocks base on size and B/M ratio.

$$SMB = (S/V + S/N + S/G)/3 – (B/V + B/N + B/G)/3 \quad (1)$$

The value (HML) factor is the equal weighted average of value premium for small stocks HMLs and value premium for big stocks HMLb.

$$HML = (HMLs + HMLb)/ 2 \quad (2).$$

$$HMLs = S/V - S/G \quad (2.a)$$

$$HMLb = B/V - B/G \quad (2.b)$$

The momentum (WML) factor is the equal weighted average of momentum premium for small stocks WMLs and momentum premium for big stocks WMLb.

$$WML = (WMLs + WMLb)/ 2 \quad (3).$$

$$WMLs = S/W - S/L \quad (3.a).$$

$$WMLb = B/W - B/L \quad (3.b).$$

We also constructed the momentum factor with intersection of liquidity factor that is the equal- weighted average of momentum premium for illiquid stocks WMLi and momentum premium for liquid stocks WMLl.

$$WML = (WMLi + WMLl)/ 2 \quad (4).$$

$$WMLi = I/W - I/L \quad (4.a).$$

$$WMLl = l/W - l/L \quad (4.b).$$

Dependent Variable Portfolio Formation

This study considers the eight-extreme excess portfolio returns on Pakistan Treasury bill rate on B/M ratio and momentum factor for small and big stocks. Also examine the extreme four excess portfolio returns for momentum on illiquid and liquid stocks by replacing momentum factor for small and big stocks.

Methodology

We use three different step-wise asset pricing model to examine the portfolio returns in relation to given risk factors for monthly time series data. The first step is to estimate the capital asset pricing model (Sharpe, 1964), this model assumes that stock returns only depend on market factor. The second step is to estimate the Fama and French three factor model (Fama and French, 1993), this model is the extension to CAPM by adding two factors that is size and value. The third

step is to examine the Carhart's four factor model (Carhart, 1997), it add the momentum factor to Fama and French three factor models. These models are given below in number (5), (6) and (7).

$$Rp_{i,t} - Rf_t = \alpha_i + b_i(Rm_t - Rf_t) + e_{i,t} \quad (5)$$

$$Rp_{i,t} - Rf_t = \alpha_i + b_i(Rm_t - Rf_t) + s_i(SMB_t) + h_i(HML_t) + e_{i,t} \quad (6)$$

$$Rp_{i,t} - Rf_t = \alpha_i + b_i(Rm_t - Rf_t) + s_i(SMB_t) + h_i(HML_t) + w_i(WML_t) + e_{i,t} \quad (7)$$

Where $Rp_{i,t}$ present the return on portfolio i for month t, Rf is risk free rate for month t, Rm is market return for month t, (Rm-Rf) is the excess return on market to risk free rate known as market premium, 'α' is intercept that measures abnormal profit and 'b' is the coefficient of market factor. SMB is the difference between portfolio returns on base of small and big stocks known as size premium, HML is the difference between portfolio returns on base of high (value) and low (growth) B/M ratio known as value premium and WML is the difference between portfolio returns on base of previous high returns (winner) and previous low returns (loser) known as momentum premium. Where si, hi and wi are the coefficient of SMB, HML and WML respectively.

Capital asset pricing model assumes that the value of intercept ('α') must be equal to zero that is fully explained by market factor. If the value of intercept is significant and not equal to zero, it shows that CAPM failed to fully explain the portfolio returns and it encourages the investors to look for other CAPM anomalies. This study use OLS Newey-West standard errors with maximum lags to consider autocorrelation and heteroskedasticity issue in time series data.

Empirical Result

Table 1 reports the mean, standard deviation and p-value of explanatory factor that is market premium (Rm-Rf) which is excess market return to 6 months Treasury bill rate. Further it reports portfolio returns of Small (S) and Big (B) firms as well as size premium (SMB). The result shows that market premium is positive and different from zero (p-value 0.016), it is followed by the risk aversion assumption. The monthly effect of market premium for given period is 1.118%. The monthly mean value of portfolio returns of S and B shows that B firms outperform the S firms. Recent literature argue that the behavior of small firm's is not consistent over various time period, sometime the effect of size anomalies vanishes and even behave reverse (Fama and French 2012). The reason for such behavior could be tight credit terms during recession in economy or business cycle. The mean value of size premium is negative and statically significant. Cakici N. and Tan S. (2014) reported that the size premium is negative but insignificant in three Asia Pacific, Japan and ten European countries while negatively significant in Denmark and Portugal.

Table 1. Mean and Standard Deviation of Asset Pricing Factor in Market and Size

	Rm-Rf	SMB	S	B
Mean	0.011178151	-0.00364	0.000891	0.004532
Standard Deviation	0.090872234	0.048129	0.074004	0.067765
P-value at 95%.	0.015646705	0.008287	0.012742	0.011668

The table 1 reports the monthly mean, standard deviation and p-value (95% confidence level) of market premium (Rm-Rf), size premium (SMB), Small (S) and Big (B) firms on the basis of market value. Market premium (Rm-Rf) presents the difference of returns on KSE-100 index and 6-month Pakistan T-bill rate. Small (S) presents the portfolio returns of small stocks (low market value). Big (B) presents the portfolio returns of big stocks (high market value). Size premium (SMB) presents the difference between the portfolio returns of Small and Big firms.

Table 2 reports the monthly mean, standard deviation and p-value of value premium (HML), value factor for small (HMLs) and big firm's stocks (HMLb) and the difference between HMLs and HMLb that is HMLs-b. The result shows that the mean value of value premium for small stocks are high than the mean value of value premium for big stocks and statistically significant. The mean value of HMLs-b indicates that the value premium for small stocks significantly outperform the value premium for big stocks by 1.06% per month. Fama & French (2012), Cakici N. and Tan S. (2014), Cakici N. et al (2013) evidence that value premium for small stocks are larger than the value premium for large stocks. The mean value of value premium (HML) is negatively and statistically significant.

Table 2. Mean and Standard Deviation of Asset Pricing Factor: Value

	HMLs	HMLb	HML	HMLs-b
Mean	0.002812	-0.00782	-0.00251	0.010636
Standard Deviation	0.058948	0.062174	0.047479	0.07526
P-value at 95%.	0.01015	0.010705	0.008175	0.012959

The table 2 reports the monthly mean, standard deviation and p-value (95% confidence level) of value premium (HML), value premium for small stocks (HMLs) and value premium for large stocks (HMLb). It also reports the difference between HMLs and HMLb that is HMLs-b. HML factor is constructed by following the procedure of Fama and French (2012). HML presents the

difference of portfolio returns of high book equity to market equity ratios (value stocks) and low book equity to market equity ratios (growth stocks). It is the equal-weight average returns of HMLs and HMLb.

Table 3 reports the monthly mean, standard deviation and p-value of momentum premium (WML), as well as the momentum factor for small (WMLs) and big firm's stocks (WMLb) and the difference between WMLs and WMLb that is WMLs-b. The result shows that the mean value of momentum premium for small stocks are bit higher than the mean value of momentum premium for big stocks and statistically significant. The mean value of WMLs-b indicates that the momentum premium for small stocks significantly outperform the value premium for big stocks by 0.4894% per month. The mean value of momentum premium (WML) is positively (6.67% per month) and statistically significant. Which is robust with Chui, Titman and Wei (2010) and Cakici N. et al (2013).

Table 3. Mean and Standard Deviation of Asset Pricing Factor: Momentum

	WMLs	**WMLb**	**WML**	**WMLs-b**
Mean	0.069199	0.0643053	0.066752	0.004894
Standard Deviation	0.105614	0.0947656	0.091106	0.084075
P-value at 95%.	0.018185	0.0163171	0.015687	0.014476

The table 3 reports the monthly mean returns, standard deviation and p-value (95% confidence level) of momentum premium (WML), momentum premium for small stocks (WMLs) and momentum premium for large stocks (WMLb). It also report the difference between WMLs and WMLb that is WMLs-b. WML factor is constructed by following the procedure of Fama and French (2012). WML presents the difference of portfolio returns with high returns (winner) in last year (t_{-1} to t_{-10}) and with low returns (loser) in last year (t_{-1} to t_{-10}). It is the equal-weight average returns of WMLs and WMLb.

Table 4 reports the monthly mean, standard deviation and p-value momentum premium (WML), as well as the momentum factor for illiquid (WMLi) and momentum factor for liquid firm's stocks (WMLl) and the difference between WMLi and WMLl that is WMLi-l. The result shows that the mean value of momentum premium for illiquid stocks are bit lower than the mean value of momentum premium for liquid stocks and statistically significant. The mean value of WMLi-l indicates that the momentum premium for liquid stocks significantly outperform the momentum premium for illiquid stocks. The mean value of momentum premium (WML) is positive (8.05% per month) and statistically significant.

Table 4. Mean and Standard Deviation of Asset Pricing Factor: Momentum

	WMLi	WMLl	WML	WMLi-l
Mean	0.079288	0.081772	0.08053	-0.00248
Standard Deviation	0.097678	0.104554	0.088487	0.098109
P-value at 95%.	0.016819	0.018003	0.015236	0.016893

The table 4 reports the monthly mean returns, standard deviation and p-value (95% confidence level) of momentum premium (WML), momentum premium for illiquid stocks (WMLi) and momentum premium for liquid stocks (WMLl). It also report the difference between WMLi and WMLl that is WMLi-l. WML factor is constructed by following the procedure of Fama and French (2012). WML presents the difference of portfolio returns with high returns (winner) in last year (t_{-1} to t_{-10}) and with low returns (loser) in last year (t_{-1} to t_{-10}). It is the equal-weight average returns of WMLi and WMLl.

Table 5 result shows that the firm with high book to market equity ratio for small stocks outperform the firm with high book to market equity ratio for big stocks, while the firm with low book to market equity ratio for big stocks outperform the firm with low book to market equity ratio for small stocks.

Table 5. Mean and Standard Deviation of Value and Growth Stocks

	S/V	S/G	S/N	B/V	B/G	B/N
Mean	0.0037	0.0009	-0.0020	-0.0004	0.0074	0.0066
Standard Deviation	0.0826	0.0972	0.0650	0.0860	0.0644	0.0712
P-value at 95%.	0.0142	0.0167	0.0112	0.0148	0.0111	0.0123

The table 5 reports the monthly mean returns, standard deviation and p-value (95% confidence level) of value and growth stocks of small firms (low market equity) and big firms (high market equity). S/G presents the intersection of small firms with the firms with low book to market equity ratio. S/N presents the intersection of small firms with the firms with neutral book to market equity ratio. S/V presents the intersection of small firms with the firms with high book to market equity ratio. B/G presents the intersection of big firms with the firms with low book to market equity ratio. B/N presents the intersection of big firms with the firms with neutral book to market equity ratio. B/V presents the intersection of big firms with the firms with high book to market equity ratio.

Table 6 result shows that the firm high returns in last year for small stocks outperform the firm with high returns in last year for big stocks, while the firm with the low returns in last year for big stocks are larger than the firm with the low returns in last year for small stocks although both are negative.

Table 6. Mean and Standard Deviation of Winner and loser Stocks

	S/W	S/M	S/L	B/W	B/M	B/L
Rural	0.039	0.001	-0.030	0.037	0.003	-0.027
Rural	0.094	0.074	0.097	0.082	0.065	0.085
Rural	0.016	0.013	0.017	0.014	0.011	0.015

The table 6 reports the monthly mean returns, standard deviation and p-value (95% confidence level) of winner stocks and loser stocks of small firms (low market equity) and big firms (high market equity). S/W presents the intersection of small firms with the high returns (winner) in last year. S/M presents the intersection of small firms with the medium returns in last year. S/L presents the intersection of small firms with the low returns (loser) in last year. B/W presents the intersection of big firms with the high returns (winner) in last year. B/M presents the intersection of big firms with the medium returns in last year. B/L presents the intersection of big firms with the low returns (loser) in last year.

Table 7 result shows that the firm high returns in last year for illiquid stocks slightly outperform (almost equal) the firm with high returns in last year for liquid stocks, while the firm with the low returns in last year for liquid stocks are bit larger (almost equal) than the firm with the low returns in last year for illiquid stocks.

Table 7. Mean and Standard Deviation of Winner and loser Stocks

	I/W	I/M	I/L	L/W	L/M	L/L
Mean	0.0452	0.0029	-0.0341	0.0445	0.0022	-0.0372
Standard Deviation	0.0828	0.0561	0.0787	0.0905	0.0836	0.1066
P-value at 95%.	0.0143	0.0097	0.0135	0.0156	0.0144	0.0184

The table 7 reports the monthly mean returns, standard deviation and p-value (95% confidence level) of winner stocks and loser stocks of illiquid firms (low turnover) and liquid firms (high turnover). I/W presents the intersection of illiquid firms with the high returns (winner) in last year. I/M presents the intersection of illiquid firms with the medium returns in last year. I/L presents the intersection of illiquid firms with the low returns (loser) in last year. L/W presents the intersection of liquid firms with the high returns (winner) in last

year. L/M presents the intersection of liquid firms with the medium returns in last year. L/L presents the intersection of liquid firms with the low returns (loser) in last year.

Table 8 reports the correlation between the given risk factors in Pakistan equity market for monthly time period from 2001 to 2012. It allows investors to design a portfolio among market, size, value and momentum strategies. The momentum factor is negatively correlated with all other risk factors which indicates that momentum perform well when other perform badly and vice versa. The same result is reported in table 9 also.

Table 8. Correlation of Risk Factors

	Rm-Rf	**SMB**	**HML**	**WML**
Rm-Rf	1			
SMB	-.329**	1		
HML	0.096	-0.072	1	
WML	-0.134	-0.101	-0.148	1
***. Correlation is significant at the 0.01 level (2-tailed).*				

Table 8 reports the Pearson pair-wise correlation of explanatory four factors for monthly time series over. These four factors are excess market return (MKT), size premium (SMB), value premium (HML) and momentum premium (WML) on base of size.

Table 9. Correlation of Risk Factors

	Rm-Rf	**SMB**	**HML**	**WML**
Rm-Rf	1			
SMB	-.329**	1		
HML	0.096	-0.072	1	
WML	-0.122	-0.077	-0.154	1
***. Correlation is significant at the 0.01 level (2-tailed).*				

Table 9 reports the Pearson pair-wise correlation of explanatory four factors for monthly time series over. These four factors are excess market return (MKT), size premium (SMB), value premium (HML) and momentum premium (WML) on base of liquidity.

Table 10 report the alpha and beta estimation of standard CAPM for time period of 2001 to 2012. The study used OLS through Newey-West standard errors with 6 lags to consider autocorrelation and heteroskedasticity in the returns. The result shows that alpha for value excess returns to T-bill is negatively insignificant while for loser excess returns to T-bill stocks the alpha is negatively significant at 95% confidence level. It is interesting to find that alpha

for all winner stocks excess returns, both intersect with size and liquidity are positively and highly significant. The beta value of the market premium is positive and statistically significant for each given portfolio. The value of F-Statistics indicates that the overall model is statistically significant.

Table 10. Alpha and Beta Estimation Results Based on Market Risk Factor (CAPM)

	a_i	b_i	F-Stat (P-value)
S/G-Rf	-0.0108	0.3885	27.47 (0)
t-Stat	-1.3600	5.2400	
S/V-Rf	-0.0074	0.3397	30.32 (0)
t-Stat	-0.9200	5.5100	
B/G-Rf	-0.0047	0.4289	30.32 (0)
t-Stat	-1.0800	8.4800	
B/V-Rf	-0.0142	0.5779	38.85 (0)
t-Stat	-2.3400	6.2300	
S/W-Rf	0.0280	0.3153	27.08 (0)
t-Stat	3.4700	5.2000	
S/L-Rf	-0.0426	0.4436	11.48 (0)
t-Stat	-4.6400	3.3900	
B/W-Rf	0.0252	0.3796	31.41 (0)
t-Stat	3.0800	5.6000	
B/L-Rf	-0.0406	0.5195	26.1 (0)
t-Stat	-5.3800	5.1100	
I/W-Rf	0.0354	0.2211	14.7 (0.0002)
t-Stat	4.8500	3.8300	
I/L-Rf	-0.0442	0.2493	6.47 (0.0121)
t-Stat	-6.2300	2.5400	
L/W-Rf	0.0325	0.4202	19.39 (0)
t-Stat	4.1400	4.4000	
L/L-Rf	-0.0516	0.6298	31.16 (0)
t-Stat	-6.2100	5.5800	

Table 10, reports the alpha coefficient and beta estimates of capital asset pricing model (CAPM), where a i present the alpha for each given portfolios and b i present coefficient of market premium (MKT). The models are estimated using OLS Newey-West standard errors with six lags. The value in parentheses below the coefficient estimate present t-statistics.

Table 11 report the alpha and beta estimation of Fama & French (1993) three factor model by considering monthly data from 2001 to 2012. The study used OLS through Newey-West standard errors with 6 lags to consider autocorrelation and heteroskedasticity in the returns. This model repeat the same behavior for alpha as standard CAPM, the table 11 results show that alpha for value excess returns to T-bill is negatively insignificant while for loser excess returns to T-bill stocks the alpha is negatively significant at 95% confidence level. Further it found that the alpha for all winner stocks in intersection with size and liquidity are positively and highly significant. The beta value of the market premium is positively and statistically significant for each given portfolio. The coefficient value (hi) of value premium is positively significant for value stocks and negatively significant for growth stocks. The value of F-Statistics indicates that the overall model is statistically significant.

Table 11. Alpha and Beta Estimation Results Based on Fama & French (1993).

	a_i	b_i	*Si*	h_i	F-Stat (P-value)
S/G-Rf	-0.009	0.649	1.403	-0.334	30.09 (0)
t-Stat	-1.690	7.300	8.730	-1.930	
S/V-Rf	-0.004	0.501	1.110	0.628	64.65 (0)
t-Stat	-0.800	8.290	7.810	4.360	
B/G-Rf	-0.006	0.423	-0.134	-0.348	30.52 (0)
t-Stat	-1.400	6.860	-1.100	-2.170	
B/V-Rf	-0.012	0.571	0.160	0.690	44.3 (0)
t-Stat	-2.160	6.280	1.110	3.610	
S/W-Rf	0.029	0.491	0.989	-0.064	11.77 (0)
t-Stat	3.680	5.940	4.140	-0.260	
S/L-Rf	-0.040	0.635	1.178	0.278	17.68 (0)
t-Stat	-6.470	4.960	6.530	1.560	
B/W-Rf	0.025	0.381	0.015	0.033	13.96 (0)
t-Stat	3.010	3.900	0.070	0.120	
B/L-Rf	-0.039	0.589	0.467	0.241	21.63 (0)

t-Stat	-6.550	6.890	1.690	1.770	
I/W-Rf	0.037	0.361	0.817	0.046	9.54 (0)
t-Stat	5.490	4.970	4.800	0.220	
I/L-Rf	-0.042	0.388	0.827	0.114	14.83 (0)
t-Stat	-7.510	4.960	3.770	0.790	
L/W-Rf	0.032	0.481	0.301	-0.164	6.53 (0)
t-Stat	4.170	4.260	1.360	-0.650	
L/L-Rf	-0.049	0.753	0.800	0.326	29.01 (0)
t-Stat	-8.280	6.930	2.820	1.770	

Table 11 reports the alpha and beta estimates of Fama and French (1993) three factor model. The value of t-statistics is used to examine the statistically significance of given risk factors. Where a_i presents the alpha for each given portfolios, b_i present coefficient of market premium (MKT), s_i present coefficient of size premium (SMB), h_i present coefficient of value premium (HML). The models are estimated using OLS Newey-West standard errors with six lags.

Table 12 reports the results of four factor model in which momentum factor is augmented with the Fama & French (1993) three factor model. The time series model OLS through Newey-West standard result in negative alpha for all excess portfolio strategies but statistically significant for half only. The coefficient (beta) value for all CAPM are positive and highly significant, as supported by literature. The coefficient (Si) for size premium (SMB) is positive and significant for almost all given portfolios. The coefficient (hi) for value premium (HML) is positive as supported by literature but only significant for high B/M ratios (that is S/V and B/V). The coefficient (wi) value for momentum premium (WML) is positive for B/M sorted stocks but insignificant. Further the coefficient value for momentum premium predicts the positive association for winner sorted stocks (for both S and B stocks) and negative association with loser sorted stocks (for both S and B stocks), both are highly significant.

Table 12. Alpha and Beta Estimation Results Based on Four Factor Model.

	a_i	b_i	Si	h_i	w_i	**F-Stat (P-value)**
S/G-Rf	-0.017	0.668	1.437	-0.305	0.106	24.71 (0)
t-Stat	-3.18	7.12	9.14	-1.86	1.36	
S/V-Rf	-0.007	0.51035	1.12605	0.64259	0.05134	52.02 (0)
t-Stat	-1.44	8.04	7.92	4.58	0.79	
B/G-Rf	-0.0095	0.43217	-0.117	-0.3335	0.05182	22.07 (0)

t-Stat	-2	6.66	-0.95	-2.15	0.76	
B/V-Rf	-0.019	0.58995	0.19429	0.71928	0.10659	30.05 (0)
t-Stat	-3.64	6.1	1.36	3.95	1.3	
S/W-Rf	-0.014	0.605	1.197	0.114	0.649	53.89 (0)
t-Stat	-2.26	8.54	10.41	0.84	9.03	
S/L-Rf	-0.011	0.559	1.041	0.160	-0.428	62.84 (0)
t-Stat	-2.52	5.45	7.69	0.87	-5.95	
B/W-Rf	-0.007	0.466	0.171	0.166	0.486	11.45 (0)
t-Stat	-1.13	5.18	0.97	0.79	4.14	
B/L-Rf	-0.010	0.512	0.326	0.121	-0.438	43.9 (0)
t-Stat	-1.28	7.08	2.23	0.91	-3.78	

Table 12 reports the alpha and beta estimates of four factor asset pricing model that is Fama and French (1993) three factor model augmented by momentum factor within intersection of size. The value of t-statistics is used to examine the statistically significance of given risk factors. Where a i presents the alpha for each given portfolios, b i present coefficient of market premium (MKT), s i present coefficient of size premium (SMB), h i present coefficient of value premium (HML) and w i present coefficient of momentum premium (WML). The models are estimated using OLS Newey-West standard errors with six lags.

Table 13 reports the four factor model but this time momentum factor is constructed by intersection with liquidity instead of size. The coefficient (wi) value for momentum premium predicts the positive significant association for winner sorted stocks for both liquid and illiquid stocks, while negative significant association with loser sorted stocks for both liquid and illiquid stocks.

Table 13. Alpha and Beta Estimation Results Based on Four Factor Model.

	a_i	b_i	Si	h_i	w_i	**F-Stat (P-value)**
S/G-Rf	-0.014	0.658	1.417	-0.319	0.055	34.76 (0)
t-Stat	-2.98	7.12	8.36	-1.85	0.72	
S/V-Rf	-0.005	0.503	1.113	0.632	0.012	55.55 (0)
t-Stat	-0.85	7.83	7.41	4.37	0.18	
B/G-Rf	-0.006	0.424	-0.132	-0.346	0.005	22.87 (0)
t-Stat	-1.25	6.54	-1.03	-2.15	0.08	

B/V-Rf	-0.016	0.578	0.172	0.703	0.048	34.42 (0)
t-Stat	-3.21	6.13	1.13	3.68	0.63	
I/W-Rf	-0.004	0.437	0.947	0.189	0.512	27.27 (0)
t-Stat	-0.6	6.17	7.02	1.55	6.25	
I/L-Rf	-0.003	0.315	0.703	-0.022	-0.487	105.29 (0)
t-Stat	-0.67	4.43	5.56	-0.19	-6.87	
L/W-Rf	-0.008	0.555	0.428	-0.025	0.499	10.99 (0)
t-Stat	-1.2	5.21	2.42	-0.13	4.77	
L/L-Rf	-0.009	0.678	0.672	0.186	-0.503	35.97 (0)
t-Stat	-1.17	6.7	4.24	0.9	-5.18	

Table 13 reports the alpha and beta estimates of four factor asset pricing model that is Fama and French (1993) three factor model augmented by momentum factor within intersection of liquidity. The value of t-statistics is used to examine the statistically significance of given risk factors. Where a i presents the alpha for each given portfolios, b i present coefficient of market premium (MKT), s i present coefficient of size premium (SMB), h i present coefficient of value premium (HML) and w i present coefficient of momentum premium (WML). The models are estimated using OLS Newey-West standard errors with six lags.

Conclusion

Some empirical studies conducted in emerging equity markets including Asia and many studies conducted in developed equity markets to identify the facts regarding size, value and momentum effects. The Karachi Stock Exchange (KSE) is one of the popular emerging equity market of Asia but we lack empirical literature in this context. Emerging equity markets are in large number of today population of the world and attract lot of significance. It is among the pioneer studies in Pakistan equity market which consider the size and liquidity pattern in momentum factor.

This study has three key findings, firstly we identified the size pattern in value and momentum effect; secondly, we identify the liquidity pattern in momentum effect. Thirdly we constructed excess portfolio base on size and value, size and momentum and lastly liquidity and momentum and regress by using CAPM, Fama & French (1993) three-factor model, and Carhart four factor model.

We found market premium is positive and different from zero. The average portfolio returns of big firms are larger than the small firms and the mean value of size premium is negative and statically significant. The results are robust with Cakici and Tan (2014). One of the purposes of this study was to differentiate the

value and momentum premium on the base of size. This study reported that value premium for small stocks are larger than big stocks. While the mean value of momentum premium for small stocks are higher than the big stocks and statistically significant. This result concluded that value and momentum premium is influence by small stocks. On other hand the mean value of momentum premium for illiquid stocks are equal to liquid stocks and individually statistically significant. The momentum factor is negatively correlated with all value and other risk factors which indicate that momentum perform well when other performs badly and vice versa. It has importance for investors to diversify risk through portfolio formation.

The CAPM (5) result shows that the beta value of the market premium is positively significant for each given portfolio and the alpha for all winner stocks excess returns, both intersect with size and liquidity are positively significant. The Fama & French three factor model (6) shows that coefficient value for value stocks and growth stocks are positively and negatively respectively statistically significant. The Carhart four factor model shows that the market and size factor is positively significant. The coefficient value for value premium is positive and but only statistically significant for value stocks both small and big. While the coefficient value for momentum premium is positive for winner and negative with loser stocks both are highly significant. On other hand liquidity patterns in momentum factor by using four factor models predict that the coefficient value for momentum premium predicts the positive significant association for winner stocks and negative significant association with loser stocks.

Concluding Remarks

It has been noticed that the inclusion of size and liquidity pattern did not influence the coefficient results, but the mean value for momentum is larger in liquidity pattern than size pattern.

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