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Stock Market Efficiency and Size of the Firm: Empirical Evidence from Pakistan

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Abstract: *The purpose of this paper is to examine the relationship between firm size and excess stock returns in Pakistani market. We construct a set of 10 portfolios based on size i.e., market capitalization, total assets and sales for the period between 2007 and 2011, and analyze the annual stock returns by using sorting and Fama & Macbeth model. The results of the study indicate a prominent size effect where smaller firm or size portfolios are found to have a greater average annual excess returns than bigger firm or size portfolios during the period under analysis. We find that small firms have significantly greater excess returns than larger firms. The study has strong implications for mutual funds managers, investment analysts as well as small investors who are continuously at a lookout for the trading strategies that beat the market.*

Keywords: *Firm size, Stock return, Stock market, Size effect, Mutual fund and informational efficiency.*

JEL: *L25, G12, G1, G31, G23, G14.*

Introduction

Pakistani stock market has witnessed rapid changes and evolution from a dull to an emerging stock market over the decade of 2000s. Improved market observation, trading mechanism and introduction of new financial instruments have made it a centre of attraction for the local and international investors. Entrance of Foreign Institutional Investors (FII's) and the impressive growth of the banking, corporate sector and mutual fund industry have further increased the importance of Pakistani stock market. With three organized stock exchanges and 638 listed companies, market capitalization of about Rs. 3,587,539.09 million and average daily trading volume of Rs. 248.46 million in year 2011 represent the progress of the market in the recent past.

In such an emerging market, funds managers, institutional investors, security analysts and other market players are constantly searching for trading strategies that can outperform the market. In this perspective, an excessive empirical studies have shown the possibility of extra normal returns by using active business and investment strategies based on a number of firm's variables such as size by Banz (1981), leverage by Bhandari (1988), price earnings ratio by Basu (1977), book to market ratio by Stattman (1980), and Rosenberg and Lanstein (1985) etc. These evidences are generally known as CAPM anomalies.

One of the most noted influences of stock market pricing behavior is the phenomenon known as the "size effect". Generally, studies of term size effect mean that small firms stocks provide higher risk adjusted returns than the stocks of large firms. The initial studies of the size effect

are credited to Banz (1981) and Reinganum (1981). Recent studies, however, find that the tendency of small stocks to have higher returns than large stocks is not common to all the time periods and all the markets (Dimson and Marsh, 1999; Al-Rojoub et al., 2005). Furthermore, several studies have found that some markets have a return premium associated with large stocks, i.e., a reverse size effect (Lin and Wang, 2003).

Detection of the size effect led the researchers to investigate the possible causes as its presence implies that either the CAPM is mis-specified or that market is inefficient. As stated earlier, a number of research studies have comprehensively examined the existence and possible causes of size effect. However, most of these studies relate to the U.S and other mature stock markets. Similar research for emerging stock markets including Pakistan is limited and relatively more recent in origin. Like many emerging markets, Pakistani capital market also suffers from unsatisfactory corporate governance, market manipulation and insider trading problems. Investor mostly trades speculatively with very short holding period. The turnover ratio of stocks at KSE has been very high, Rs. 248.46 million, showing that investors were interested more in short term gains and ignored long term investment objectives based on the future profitability of a firm. Despite this, Karachi Stock Exchange of Pakistan's capital market is the biggest and the most liquid Stock Exchange and was declared the best performing Stock Exchange of the world for the year 2002. Such a unique investment environment provides a natural laboratory to study the stock return issue and its relationship with firm size and to know whether there is a size effect using Pakistani stock data or not. This is the first study to analyze the relationship between size effect and stock return in Pakistan.

In this study, we have analyzed the relationship between firm size effect and excess stock returns in Pakistan. We construct a set of 10 portfolios based on size i.e., market capitalization, total assets and sales

for the period between 2007 and 2011, and analyze the annual stock returns. The results indicate a prominent size effect where smaller firm or size portfolios are found to have a greater average annual excess returns than bigger firm or range size portfolios during the period under analysis. This result is consistent with our proposition that a firm size effect exists in an emerging stock market of Pakistan.

The remainder of this study is organized as follows: Section 2 provides the institutional information on stock market in Pakistan. Section 3 discusses the relevant size effect literature. Section 4 describes the research methodology, data collection procedures and statistical tests relevant to this research. Section 5 provides the data analysis and Sections 6, 7 and 8 describe the results, findings and concluding remarks respectively.

Review of Pakistani Stock Market

The Karachi Stock Exchange (KSE) is Pakistan's first stock exchange and was established in 18 September 1947 just one month after Pakistan became an independent state. The other stock exchanges in Pakistan, the Lahore Stock Exchange (LSE) and the Islamabad Stock Exchange (ISE) were established in 1974 and 1997 respectively. A recent survey shows that approximately 87% of the turnover occurs at KSE, 12% at LSE and 1% at ISE.

The most popular index tracking the overall prices on the market is the KSE 100 index which is a market capitalization weighted index of 100 stocks consisting of top market capitalization companies from each of the 34 sectors. The remaining 66 firms are selected on the basis of market capitalization without considering any sector. The securities traded in the market include ordinary shares, preference shares, redeemable certificates and term-finance certificates (corporate bonds). The ordinary share is the most traded security. Since 2003, future trading in some

active stocks has also started.

Despite KSE's relatively small size, the market has come under the attention in recent years. According to the International Finance Corporation (1992) it was ranked as the third according to percentage increase in the local stock market index in 1991. More recently in 2002, KSE was reported to be the best performing stock market in the world according to the U.S news magazine Business Week. Similarly, according to the Country Report for Pakistan by International Monetary Fund (2004), improved macroeconomic conditions, low interest rates, excess liquidity, and better regulation and supervision in the market were the factors that fuelled this rapid rise. With respect to the turnover ratio, the market was ranked as first and third in 2003 and 2006, respectively (Global Stock Markets Fact book, 2004 & 2007).

Literature Review

Banz (1981) and Reinganum (1981) were pioneers to analyze the association between size and stock returns. They found that firm size, or market capitalization; measured as the market value of equity (ME), affect the stock returns at a highest level. The larger size (high ME) firms earn less returns than the smaller (low ME) firms.

Basu (1977) proved that the stocks that have low P/E perform better than those, which have high P/E. In 1983, he re-tested Reinganum's results using a different sample period and different portfolio creation techniques and concluded that portfolios of both small firms and low P/E ratios reported highest risk adjusted returns.

Handa et al. (1989) argued that size effect was sensitive to the return measurement intervals used for the beta estimation and presented result depicting that the size effect is outstanding when the beta is estimated with the annual asset return.

Fama and French (1995) proposed that small firms incur financial distress. The higher returns are reward for this elevated risk. Portfolios of small firms are less diversified as the management of the small size firms is risk lover which makes the portfolio less diversified compared to the large firms. This can increase the level of risk of small stocks as argued by Schwert (2002).

Hou and Moskowitz (2005) suggest that the return premium earned by small stocks is partly due to the passive reaction of these stocks to information. They suggest that small firms' have returns that are different from large firms.

Friend and Lang (1988) attempt to describe the size effect by Standard & Poor's quality rankings for stocks over the period from 1962 to 1986. They found that stock returns are better determined by quality rankings compared to any other measure including beta. These rankings also explain the size effect to a higher level.

Badrinath and Kini (1994) examine the effects of size, price-earnings, and Tobin's Q on stock returns for the period from 1967 to 1981. They conclude that the size effect prevails after regulating for both P/E and Tobin's Q. The results demonstrate that the size effect is robust with respect to its relationship with the stock returns.

Ovtcharova (2003) finds a significant size effect interacting with the relationship between institutional ownership levels (IO) and stock returns. Stocks with high IO were found to have higher returns than stocks with the lower IO for the period between 1982 and 1994. A "pure size effect" premium was found to be significant, but only for the low IO stocks. The researcher also suggests that poor information and liquidity can be represented by the size effect in small firms and the compensation for these factors is provided by higher returns.

Fama and French (2006) examine the relationship between value premiums, size effects and stock returns of firms listed at the New York

Stock Exchange (NYSE), American Stock Exchange (AMEX), and National Association of Securities Dealers Automated Quotations (NASDAQ). They found the existence of a size premium in the returns of small stocks. They suggested that larger value premium is present in smaller stocks compared to larger stocks. The value premium was measured by book to market value of equity. The researcher concluded that firm beta does not play any role in determining the expected stock returns.

Herrera and Lockwood (1994) examine the Mexican Stock Market for the time period between 1987 and 1992. They find that risk (as measured by beta) is positively related to the average returns and size is negatively related to these returns. They also argue that stock prices are determined by the firm size and the effects of beta are not significant.

The relationship between cash flow risks, firm size and returns from 1957 to 1994 in the Tokyo Stock Exchange is examined by Gomez et al. (1998). They find that the cash-flow-risk increases as the firm size decreases. Furthermore, smaller firm size translates into positive excess returns. Thus, firm size may act as a proxy for cash-flow risk and this risk is not captured by beta in defining the excess returns of small firms over large firms.

The relationship between the predictability of returns and firm size for the London Stock Exchange during the period between 1982 and 1995 was examined by Mills and Jordanov (2000). They find a size effect where small firms have notably greater excess returns than large firms. In addition they suggested that firm beta is limited is explaining risk related size effect. Elfakhani and Wei (2003) study the effects of firm size on the returns of Canadian stocks during the period between 1970 and 1994. They find a size effect (higher returns for small stocks), but only for the high share-price stocks.

Choi and Zhao (2007) find that the returns of small size firms lag those of large firms for the New Zealand Stock Market over the period

between 1991 and 2001. Mills and Jordanov (2000) and Chang et al. (1999) find analogous results for the London Stock Exchange, as well as six Asian Markets and the U.S market, respectively. They conclude that firm size contains information about the cross-autocorrelation of returns. Therefore, size may incorporate information compatible for return estimation.

Dimson and Marsh (1999) document a significant size effect in the U.K. They show that the U.K stock prices constituted a small-firm premium of 6% for the period between 1955 and 1987. This anomaly was publicized by the introduction of the Hoare Govett Smaller Companies (HGSC) index in 1987. In the following period (1989–1997), the authors find a small cap discount of around 6%.

Lin and Wang (2003) examine returns in the Taiwan stock market for the period between 1991 and 2000. In this study, they group stocks into portfolios based on the inflated returns. Average excess returns were found to be positively correlated with both size and coskewness, leading them to conclude that size and coskewness are closely related. The sophisticated analysis of the said relationship suggests that small stock portfolios have higher systematic skewness risk. Again, it appears that size may take into account the effects of risk. Furthermore, Lin and Wang (2003) noted a reverse size effect on portfolio returns (i.e., a return premium to larger stocks) during the period between 1991 and 2000.

Al-Rojoub et al. (2005) examined the size effects related to the 10 size deciles in the center for research in security prices (CRSP) tapes over the period from 1970 to 1999. They found that size is related with the stock returns only in 1970's. This premium was averted during the 1980's where large firms showed association with the stock returns. No size premium was found for either small or large stocks during the 1990's.

Shevlin and Shores (1993) discuss the ramification of the interrelationship between firm size, returns and unexpected earnings.

Specifically, a negative (positive) relationship is found to prevail between firm size and returns when unexpected earnings are positive (negative). This may suggest a differential relationship between size and returns based on the direction of the market. In a study similar to Bhardwaj and Brooks (1993), Kim and Burnie (2002) examine the size effect in the context of the economic cycle. They argue that during the expansion period there are higher levels of abnormal returns associated with the small firms as compared to the large firms.

Guo (2004) looks at the relationship between firm size and returns during changes in the federal funds rate for a bear period (1974–1979) and for a bull period (1988–2000). He suggested the higher impact of monetary policy on small firms. His results proved that the change in federal funds leads to a higher level of negative returns for small sized firms. On the contrary, a lack of size effect was noted for the bullish period .

Sample and Data Collection

The sample for this study consists of 50 companies forming part of KSE 100 index over the period between 2007 and 2011. Out of the selected sample companies, we form two equally weighted portfolios namely small size and large size on the basis of size measure (market capitalization, total assets and sales). Data for the study is collected from the following sources.

Stock prices data is collected from the websites of business recorder and Karachi Stock Exchange. The data for dividend, total assets and sales is gathered from respective company's financial report of the particular year.

Data Analysis

The KSE 100 index companies are ranked on the basis of the size of firms i.e., market capitalization, total assets and sales. The ranked sample companies are divided into two equally weighted groups named as small and large size groups. The small stock portfolios consist of lowest 25% of the companies listed on KSE 100 index. Similarly, the large stock groups consist of top 25% or 25 companies with largest size. The study uses three alternative measures of the size that is market capitalization, total assets and sales.

In order to test the size effect we have used the following two methods. The first method is sorting. We sort firms based on their size from largest to smallest, and then compare average returns among these size groups. Fama & French (2008) (P. 1654) describe the main advantage of this method as portraying a "simple picture" of how average returns vary across firms with particular characteristics such as size. Using this methodology, we calculate average returns of the groups over the time horizons.

The previous studies tend to report these average returns as the most relevant information. Fama & French (1992) and Horowitz et al. (2000a) carry out similar tests in their studies. The second method to test size effect is the Fama & Macbeth technique. In order to test for size effect, we regress the excess portfolio return (dependent variable) on the excess market return (independent variable).

The independent variables of the study are market capitalization, total assets and sales whereas the stock return is the dependent variable. Independent variable is the proxy for firm size. There are some other variables that affect changes in the dependent variable. These factors may increase or decrease the magnitude or strength of the relationship between the independent and dependent variables.

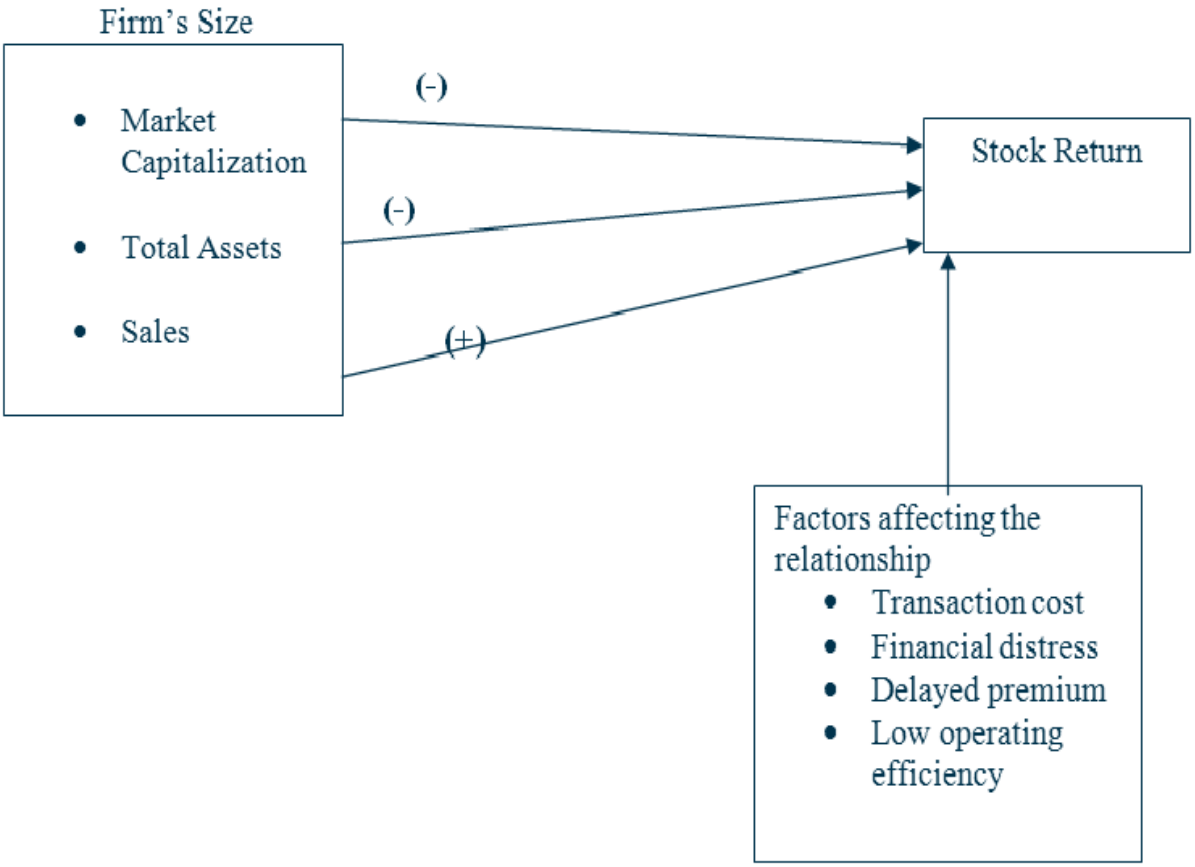

Figure 1 – Conceptual framework

Results

The summary statistics of the portfolio mean excess returns of size sorted portfolios over the period 2007 to 2011 are provided in the Table 1. It is clearly visible from this Table that mean excess returns of all small stocks portfolios (P10) are much higher than those of large stocks portfolios (P1). The mean return on P10 market capitalization (MC) is found to be 8.61% per year as against -0.35% per year on P1 MC. This clearly provides a size premium of 9%. Using total assets and sales, the size premiums are found to be 8% and 9.22% respectively. An examination of their respective t statistic reveals the fact that all the size premiums (SMB) and mean excess returns of small stocks portfolios

(P10) are significant at a 5% level of significance.

It is clear from the Tables 2, 3 and 4 that alpha values (representing extra normal returns on size sorted portfolios) decline monotonically as one moves from small to large stocks portfolio (i.e., from P10 to P1) irrespective of the size measure used. The small stocks portfolio sorted on the basis of the market capitalization has provided a statistically significant extra-normal return of 9.108 % per year. The extra normal returns generated by total assets (TA) P10 and sales (S) P10 are found to be 8.5 and 10.26 percent respectively. All these returns have been found to be statistically significant at 5% significance level. The same is true for all P9 portfolios. However, as one moves from P10 to P1, the value of alpha (i.e., extra normal returns) declines sharply and for the large stocks portfolios, it even turns negative as the alpha values for P1MC and P1TA and P1S are -0.41, - 0.20 and -.138 respectively.

This implies that while small stocks portfolios earn positive extra risk -adjusted returns, the large stocks portfolios provide lower return than the appropriate level of return at their level of risk. These findings indicate the presence of a strong size effect in Pakistani stock market irrespective of the size measure used i.e., market or non-market based. These findings are contrary to Berk (1995) who reported that size effect in the U.S market disappears when a non-market based measure is used to measure the company size. These empirical results show the presence of a strong size effect (i.e., small stocks portfolio outperforming the portfolio of large stocks) over the five year period (2007-2011).

Table 1 shows the excess mean return of portfolio on the basis of size portfolio (proxies). In this Table, P1 represents larger group and P10 represents the smaller group. As we move from P1 to P10 we find that the excess mean returns are increasing from larger groups to smaller groups.

Table 1 - Comparison of Mean Returns of Small and Large Size Portfolios

Portfolio	Market capitalization	Total assets	Sales
P1	-0.35	-0.17	-0.13
P2	0.09	-0.04	0.60
P3	0.10	0.06	0.68
P4	0.53	0.17	0.82
P5	0.61	0.34	0.54
P6	0.91	0.57	0.75
P7	1.15	1.23	1.31
P8	2.28	3.32	1.96
P9	3.07	3.43	0.81
P10	8.61	8.00	9.22

Market capitalization (MC) column represents return of groups that are formed on the basis of MC. P1, the largest group shows the return of -0.35 whereas the smaller group P10 shows the return of 8.61. This proves our hypothesis that the smaller firms on average show greater returns than the larger firms.

The second column of total assets represents return for portfolios that is formed on the basis of TA. P1, the largest group shows the return of -0.17% whereas the smaller group P10 shows the return of 8.00%. Using TA proxy for size we also find out the same result that smaller firm out performs the larger ones. The third and the last column of sales shows the portfolio returns formed on the basis of sales. Here, we also find out the same result that the small firms have greater mean return than the large firm. The above results are consistent with the previous researches conducted by Schwert (2002), Hou and Moskowitz (2005), Fama & French (2006), Kousenidis (2005), Ising et al. (2006) and Choi and Zhao (2007).

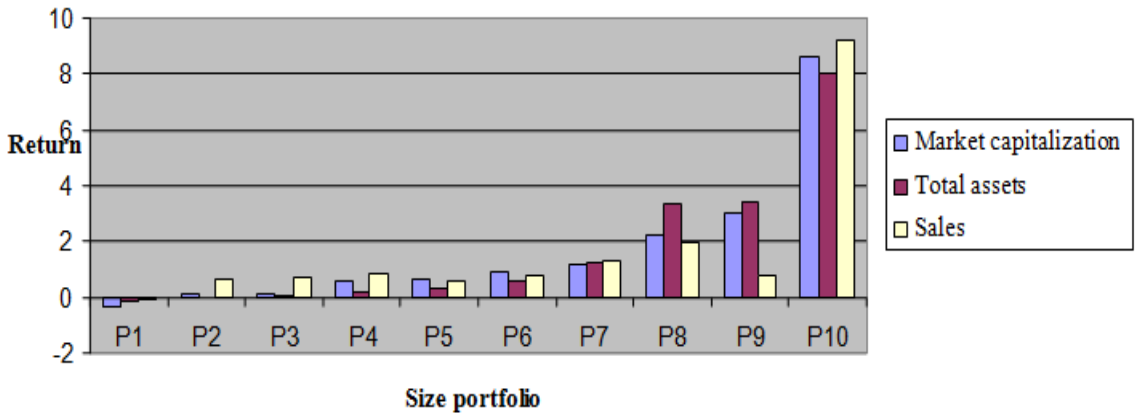

Figure 2 - Mean Return Larger to Smaller Size

In the above graph the returns of size-sorted portfolios are presented on vertical axis and size of the firm is shown on the horizontal axis. The graph clearly indicates that as we move from larger size portfolio (P1) to smaller size portfolio (P10) the mean return increases.

Table 2 - Results of Portfolios Sorted on the Basis of Market Capitalization

Portfolio	Alpha	SE (Alpha)	T (alpha)	Beta	SE (beta)	t - (beta)
P1	-0.410	0.621	-0.660	1.127	1.662	0.678
P2	0.136	0.243	0.558	3.149	0.650	4.845
P3	0.114	1.118	0.102	2.556	2.992	0.854
P4	0.507	1.438	.352	1.860	3.847	0.484
P5	0.519	0.274	1.898	0.419	0.732	0.670
P6	0.583	1.302	0.448	-3.903	3.484	-1.120
P7	0.99	1.023	0.973	-.657	2.738	-0.240
P8	2.035	1.345	1.513	-2.385	3.599	-0.663
P9	3.303	2.755	1.199	6.649	7.369	0.902
P10	9.108	7.496	1.215	11.546	20.054	0.576

Table 3 - Results of Portfolios Sorted on the Basis of Total Assets

Portfolio	Alpha	SE(Alpha)	t(alpha)	Beta	SE (beta)	t- (beta)
P1	-0.207	0.593	-0.349	1.543	1.586	0.973
P2	0.009	0.227	0.039	3.131	0.608	5.151
P3	-0.091	0.731	-0.124	-0.500	1.956	-0.256
P4	-0.062	0.942	-0.066	-2.126	2.521	-0.843
P5	0.406	1.284	0.316	3.557	3.435	1.036
P6	0.37	1.098	0.337	-1.574	2.939	-0.296
P7	1.396	0.878	1.591	5.433	2.349	2.313
P8	3.184	0.787	4.043	-0.323	2.107	-0.153
P9	3.639	2.657	1.369	6.131	7.109	0.862
P10	8.502	7.625	1.115	11.556	20.399	0.566

Table 4 - Results of Portfolios Sorted on the Basis of Sales

Portfolio	Alpha	SE(Alpha)	t(alpha)	Beta	SE (beta)	t- (beta)
P1	-0.138	0.556	-0.247	2.064	1.487	1.387
P2	0.609	0.891	0.683	2.436	2.385	1.022
P3	0.692	0.411	1.685	2.517	1.099	2.290
P4	0.997	1.00	0.977	5.244	2.676	1.960
P5	0.364	0.921	0.396	-0.980	2.464	-0.398
P6	0.540	1.235	0.438	-1.666	3.304	-0.504
P7	1.127	0.530	2.126	-1.238	1.419	-0.873
P8	0.621	1.169	0.531	-1.371	3.129	-0.438
P9	1.734	0.774	2.240	-2.047	2.071	-0.988
P10	10.265	10.331	0.994	21.828	27.638	0.790

It is clear from the Tables 2, 3 and 4 that alpha value (representing extra normal return on size sorted portfolio) increases as one moves from large stock portfolio to small stock portfolio i.e., P1 to P10. The small stock portfolio sorted on the basis of market capitalization has

provided a statistically significant extra normal return of 9.108 % per year with the t value of 1.21. The annual extra normal return generated by P10TA and P10S are found to be 8.502 and 10.265. All these returns have been found to be statistically significant at 5% level. The same is true for all P9 portfolios. However, as one moves from P10 to P1, the value of alpha (extra normal return) declines sharply and for the large stock portfolios it even turns negative. This implies that small stock portfolios earn positive extra risk adjusted returns. These results indicate the presence of a strong size effect in Pakistan.

Findings

A strong size effect existed in the selected financial market during the period from 2007 to 2011 irrespective of the firm size measured used (market or non market based). The results are in accordance with the previous researches conducted by Banz (1981) as he found a negative relationship between size and return. Furthermore, Herrera and Lockwood (1994) examined the Mexican market and found that the size is negatively related to returns. Hou and Moskowitz (2005) examined the Indian stock market and also found a strong size effect. Fama & French (2006) examined the relationship between value premium, size effect and stock returns and found the existence of size premium. London Stock Exchange was examined by Mills and Jordanov (2003) and they found a size effect where smaller firms had significantly greater excess returns than larger firms. Elfakhani and Wei (2003) study the effect of firm size on stock returns of Canadian stock and find a size effect higher for small stock. Choi and Zhao (2007) find that the returns of small size firms lag those of large firms for the New Zealand stock market.

Our results show that the average excess return of P10 (small stock portfolio) is much higher than P1 (larger stock portfolio). The average annual excess return by using market based measure i.e., market

capitalization is 7.83 % per annum. Using total assets as a measure of size we found the size premium of 8% per annum. Furthermore, by using sales as a size proxy we find a size premium of 9 % per year.

Using Fama & Macbeth model, the alpha values (representing extra normal return) increase as one moves from larger stock portfolio (P1) to smaller stock portfolio (P10) irrespective of the size proxies used. The small stock portfolio sorted on market capitalization basis has provided a significant extra normal return of 9.10% per year. The annual extra return generated by total assets and sales are found to be 8.5% and 10.26% respectively. These findings indicate the presence of strong size effect in Pakistan over the period of five years.

Conclusions

In this study, we have analyzed the relationship between firm size effect and excess stock returns in Pakistan. We have constructed a set of 10 portfolios based on size i.e., market capitalization, total assets and sales for the period between 2007 and 2011, and analyzed the annual stock returns. These results indicate a prominent size effect where small firm or size portfolios are found to have a greater average annual excess returns than large firm or size portfolios during the period under analysis. This result is consistent with our proposition that a firm size effect exists in the selected market.

The results lead us to the conclusion that the alternate hypothesis for relating each variable to the stock return stands true for Karachi Stock Exchange. There is a significant size effect on stock return. The evidence on size effect in Pakistani stock market casts serious doubts about the level of market efficiency. Availability of extra normal returns by using size based investment strategy imply that the selected market is not efficient as publicly available information i.e., firm size can be used to gain higher returns. .

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