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The Effect of Size on Stock Returns in an Emerging Financial Exchange

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Firm Size Effect, Stock Returns, Pakistan Stock Exchange (PSX), Market Anomalies, Month-Effect

ABSTRACT

This study examines the effect of firm size on excess stock returns with time variant factor of January and July. Broadly speaking, the extant literature finds negative relationship of firm size with stock returns. Smaller firms enjoy higher risk adjusted returns. This study investigates all the firms listed on the Pakistan Stock Exchange (PSX). Monthly data is used from January 2007 to November 2018; firm-level monthly closing stock price, KSE-100 index values, market capitalization are main variables of this study. Pooled Ordinary Least Squares (POLS) and firm Fixed-Effects (FE) regression techniques are applied, and results suggest that size of the firm is negatively and significantly related to the stock returns, i.e., our analysis confirms the presence of a size effect within the Pakistani equity market. The evidence suggests that investors demand higher premium while investing in small capitalized stocks. Moreover, little research has been conducted to investigate the presence of firm size effect on stock return in capital market of Pakistan. Besides, the market structure and regulatory environment of PSX is quite different from many emerging markets of the world, such as sophistication level of retail investors and presence of narrow price limits; hence that demands further investigation. Lastly, our approach is more robust as we have taken more than 340 firm-level excess stock returns data to check the size premium on monthly-basis.

INTRODUCTION

The impact of firm size on stock returns is one of the major anomalies documented by previous literature in many financial exchanges of the world. Stock returns variance are influenced by number of factors like company's financial performance, growth prospects, cost of capital, leverage, governance etc. Significant day-of-the-week effect and month effect is also being observed in return patterns. In some developed economies, size and calendar anomalies have diminished in the recent data, but those topics are still controversial while considering the emerging markets like Pakistan. In extant literature, many researchers have discussed about the aforementioned factors which consequently impact the stock returns and their variance (for example, Banz, 1981; Bettman, *et al*., 2011; Fama and French, 1995;

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2008; 2012). Similarly, Hou & Van Dijk (2019) find a robust size effect in the cross-section of expected returns after the early 1980s in the US markets. On the other hand, Yin & Liao (2021) observed that positive profitability shocks in Chinese small firms do not earn sizable returns for investors and conclude that large firms are worthwhile to invest in the long run.

This study examines the size effects on security returns in Pakistan Stock Exchange (PSX). Largely, existing literature confirms the presence of firm size effect in the financial exchanges. Empirical studies show that small firm[‡] earns abnormally high returns over long periods compared to large capitalized firm (e.g., Reinganum, 1983; Ritter, 1988; Roll, 1988). Fama and French (2012) investigate the size and momentum pattern in North America, Europe, Japan, and Asia Pacific and find declining trend in momentum and returns for smaller firms relative to bigger firms. Amihud (2002) investigates the relationship between returns and liquidity of the stocks in New York Stock Exchange (NYSE) and finds that it has significantly negative effect on stock returns. Fama and French (1995) find stock price and size factors affect the earnings of NYSE, American Stock Exchange (AMEX), and NASDAQ listed stocks.

To investigate the impact of size on returns of listed stocks in Pakistan, monthly data of three-hundred-forty-one (341) companies have been collected from Thomson Reuters DataStream. The main financial variables employed in this study are monthly closing stock price, month-end market capitalization of all the firms, month end KSE-100 index value (i.e., market index), and State Bank of Pakistan (SBP) monetary policy rate (i.e., risk-free rate).

Evidence from our study suggests that firm size effect exists in Pakistan; the findings are consistent with previous studies (for example, Banz, 1981; Bettman, *et al.*, 2011). The negative coefficient suggests that firm size is negatively associated with excess stock returns (e.g., Astakhov et al., 2019; Cheema et al., 2021). Hence investors expect higher risk premium while investing in small capitalized firms. Moreover, results of dummy / control variables are consistent with previous studies, that is, January and July effect is also documented in our study (e.g., Gaunt, et al., 2000; Bettman, *et al*., 2011).

Statement of the problem

Predicting future returns based on the firm size portfolios remains one of the key factors for investment decision by the local and foreign investors in the emerging financial markets like Pakistan, since Pakistan's equity market has seen many episodes of higher volatility and uncertainty. The purpose of this research is to analyze and evaluate the Small-Firm Effect on the return behavior of Pakistan listed securities. Moreover, Pakistan financial exchange is considered one of the most volatile markets around the globe due to manipulative practices by large market intermediaries (Khwaja & Mian, 2005) and imposition of security-wise price limits at 5% make penny stocks more vulnerable to large jumps (Rahman et al., 2021). Hence, it is worthwhile to examine the relationship between firm size and abnormal returns in Pakistan.

Significance of the Study

This study is helpful in explaining persistence of firm size effects on the stock return. Especially for those market participants that should pursue a 'buy and hold' strategy, i.e., purchase securities and hold them for medium to long-term period at Pakistan Stock Exchange (PSX). Moreover, very limited research has been conducted previously to investigate the presence of firm size effect on stock return in

[‡] The small firms include Micro-cap and Nano-cap stocks of Pakistan.

capital market of Pakistan by taking monthly observations with a dataset of more than 340 firms. A study by Mirza & Shahid (2008) suggests that size and value premium needs to be incorporated for portfolio management decisions. Another study by Tahir *et al*. (2013) was conducted by taking annual data from Pakistan. However, their evidence is inconsistent with the theoretical model, i.e., Tahir *et al*. (2013) find positive relationship between size and stock returns. Our approach is more robust as we have taken firm-level excess stock returns data to check the size premium on monthly-basis.[§] On the other hand, the market structure and regulatory environment of Pakistan is quite different from many emerging markets of the world that warrants further investigation in this market; such as enforcement of narrow scrip-wise price limits and frequent episodes of excessive volatility observed .Therefore, emerging market evidence can be quite different from developed market where firm size premium puzzle has diminished or in some developed economies large firms earn higher returns.

LITERATURE REVIEW

Banz (1981) examine the relationship between firm size and returns in stocks traded in New York Stock Exchange (NYSE) and findings show that size had a very little effect on return, especially for large and medium sized firms. Similar results also documented by Fama and French (2008), they find that higher returns are associated with highly profitable firms and not with unprofitable firms. Goyal (2017) find no size and return anomaly in U.S. financial and non-financial sector. In London Stock Exchange (LSE), Hwang *et al*. (2014) finds negative relationship between firm size and returns; besides, significantly negative relationship was observed between size and returns of 300 small capitalized firms in Australian Stock Exchange (ASX) during January 1982 to December 2006 sample period by Brailsford and Gaunt (2010). On the other hand, Chaibi, *et al*. (2014) find bigger firms in Russell 3000 index with higher returns in American stock market (AMEX). Similarly, Astakhov *et al*. (2018) conducted first meta-analysis on size premium by capturing 102 published reports and they witnessed lower size premium and decrease in publication bias intensity over time.

Gandhi & Lustig (2015) investigate the size, return and risk associated with banks operating in U.S.A. and results suggest lower risk-adjusted return for larger banks. Mirza & Shahid (2008) find size effect in Karachi Stock Exchange (now PSX) that is consistent with previous studies. In some papers, direct relationship is also being observed, that is, evidence regarding existence of firm size effect found in Zimbabwe with significant positive relationship between firm size and returns (e.g., Mazviona & Nyangara, 2014). In Sub Saharan countries, the impact of firm size and liquidity on returns was documented by Hearn (2012). Applying capital asset pricing model (CAPM) with size and liquidity factors in Bangladesh, India, Pakistan, and Sri-Lanka, Hearn (2010) find significant firm size effect in all four countries. Minovic & Zikovic (2012) has selected the companies listed on Belgrade Stock Exchange (BSE), Serbia to examine size, book to market ratio and liquidity risk on asset returns and evidence documents effect of firm size on equity pricing and returns. Existence of firm size effect in Australian stock market is also documented by Bettman, *et al*. (2011). In Hong Kong stock market significant association is observed between size and return by Ho *et al*. (2000). In Hong Kong, Korea, Malaysia, Taiwan and Thailand significant size effect is observed by Chui & Wei (1998).

Furthermore, abnormal price return patterns in financial exchanges are also observed in different trading

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[§] A study by Shah et al. (2016) has also examined the relationship between firm size and financial performance. However, their major focus is on working capital management and corporate governance between smaller and larger firms.

months and days (i.e., Month Effect and Day-of-the-Week Effect). These calendar anomalies are also being examined by academics and practitioners. Such as, Keim (1983) and Bondt & Thaler (1985) found January effect in NYSE and AMEX. Gaunt et al. (2000) find negative relationship between size and return in July and no effect in January; and Officer (1974) found some possible seasonal effects in Australian Stock Exchange (ASX). Positive January and July effect on stock returns is documented by Henker & Paul (2012), confirming tax loss selling. Seyyed *et al.* (2005) find that trading activity in holy month of Ramadan also gets affected in Saudi Arabia.

Kraft et al. (2018) also find distinct size effect in cross section. Moreover, Yu, Liu, Fung & Leung (2020) documented strong size effect in describing stock returns by incorporating another dimension of Research and Development (R&D) intensity / high-tech firms in the model. Likewise, Cheema et al. (2021) find strong resurgence of size effect in Japan after adjusting for profitability shocks; but Yin & Liao (2021) find large firms earn higher returns in the long run after adjusting for positive profitability shocks. Overall, we observe that majority of the studies find a strong presence of Small firm effect, but evidence of few studies in developed markets reveal little or diminishing of firm size effect and / or resurrection of size premium. However, based on our empirical data results, we argue that emerging markets like Pakistan, such phenomenon is still relevant and developed market evidence cannot be generalizable on emerging markets due to differences in market structure, regulatory environment and laws related to investor protection rights.

DATA AND METHODOLOGY

Data and Sampling

We obtained the month end adjusted closing share prices (i.e., adjusted for capital actions) of 341 firms selected over 143 trading months from January 2007 to November 2018, which includes 48,763 firm-month observations. Moreover, for investigating firm size effect in stock market we selected only those firms that were traded at least 30 days or more in each calendar year of the sample period. Therefore, out of 570 firms listed on the PSX, the final sample comes to 341 actively traded securities. Month end closing value of firm market capitalization (i.e., stock closing price multiplied by shares outstanding) is used for finding size of the particular stock and month end adjusted closing stock price is used to calculate stock returns. The data is obtained from Thomson Reuters DataStream. Moreover, month-end KSE-100 index value (i.e., Karachi Stock Exchange 100 is the benchmark index of Pakistan Stock Exchange) is used for measuring market return. The data is obtained from PSX website and Central Bank (i.e., State Bank of Pakistan) monetary policy rate is used as a risk-free rate to measure excess stock returns (i.e., monthly stock return minus risk-free rate).

Statistical Technique

In order to test the hypotheses, we employed, broadly used regression models in finance, on panel data (i.e., data having both cross-sectional and time series characteristics) with 48,763 firm-month observations. We first applied Pooled Ordinary Least Squares (POLS) regression, but results might be inconsistent (or not that robust) because data has panel attributes, i.e., cross-section and time series. So Hausman test has been applied for finding out appropriate estimation techniques which suggests that Fixed-Effects regression analysis is suitable for evaluating the data and interpreting the findings. Fixed effect regression is applied to remove the heterogeneity of different firms.

Model Specification

In this study basic model includes the calculation of monthly return using the same approach applied by

Officer (1974) and Bettman *et al.* (2011) for all firms in the sample. Moreover, we employed following regression analysis:

Equation#1:

$$r_{i,t} = \alpha_1 + \alpha_2 Size_{i,t-1} + \alpha_3 Market_{i,t} + \alpha_4 R_{i,t-12} + \epsilon$$

Precisely, Equation (1) explains the firm size effects on stocks return. We used natural logarithm of market capitalization the month prior to the observation start for size effect (i.e., lagged firm value). For example, if, first examination period is 28 February 2007, we utilized firm's market capitalization as of 31 January 2007; contemporaneous excess market returns and 12-month lagged stock return is included for checking / controlling co-movement and momentum effect respectively. Moreover, both stock return and market return are risk adjusted, i.e., excess returns are calculated by subtracting risk-free rate from both actual stock and market return.

Equation#2:

$$r_{i,t} = \alpha_1 + \alpha_2 Size_{i,t-1} + \alpha_3 LSP_{i,t-1} + \alpha_4 Jan_{i,t} + \alpha_5 July_{i,t} + \alpha_6 Market_{i,t} + \alpha_7 R_{i,t-12} + \epsilon$$

Equation (2) includes all variables that are used in equation (1); in addition to this a dummy variable of stock price less than or equal to PKR 5.00 is included (i.e., price with less than or equal to 5 is assigned the value of 1, otherwise zero with one-month lag – also called penny stocks). The reason for controlling stocks with lower values is that any price change in penny stocks exacerbate the return calculations. This equation also includes calendar dummy variables of January and July to investigate month's effect following Bettman *et al.* (2011) and Henker & Paul (2012). The tax-loss selling hypothesis suggests that in the last month of fiscal year, the investors liquidate some of their holdings to book capital losses and reduce tax liabilities and repurchase stocks in the first month of new fiscal year. Pakistan's fiscal-year ends in June and US fiscal-year ends in December. Hence, literature documents positive returns in the months of January and July. That is, the value equal to one, if the month is January (or July), otherwise zero. Hence, we have used control variables to clearly examine whether smaller firms explain higher risk-adjusted returns.

Equation#3:

$$r_{i,t} = \alpha_1 + \alpha_2 Size_{i,t-1} + \alpha_3 LSP_{i,t-1} + \alpha_4 LSP_{i,t-1} \times Size_{i,t-1} + \alpha_5 Jan_{i,t} \times Size_{i,t-1} + \alpha_6 July_{i,t} \times Size_{i,t-1} + \alpha_7 Market_{i,t} + \alpha_8 R_{i,t-12} + \epsilon$$

Equation (3) includes all variables that are used in above two equations in addition to that size of the firm is interacted with all dummy variables for examining the magnitude of firm size effects with penny stocks and during the months of January and July.

Dependent variable

$r_{i,t}$ = Excess monthly return[**] of security *i* at time *t*;

Independent variables

$Size_{i,t-1}$ = Natural Logarithm of current market capitalization of security *i* at time *t-1*;

$LSP_{i,t-1}$ = A dummy variable taking on the value '1' for security *i* when share price is Rs. 5.00 or less at time *t-1*, and '0' otherwise;

[**] Firstly, Monthly return is calculated by current month-end closing stock price minus previous month-end closing stock price divided by previous month-end closing stock price; then excess monthly stock return is calculated by subtracting monthly return from SBP policy / discount rate.

$Jan_{i,t}$ = a dummy variable taking on the value '1' for security *i* when *t* is the month of January and '0' otherwise;

$July_{i,t}$ = a dummy variable taking on the value '1' for security *i* when *t* is the month of July and '0' otherwise;

$LSP_{i,t-1} \times Size_{i,t-1}$ = Interaction of share price Rs. 5.00 or less with market value of security *i* at time *t*-1;

$Jan_{i,t} \times Size_{i,t-1}$ = Interaction of month of January with market value of security *i* at time *t*-1;

$July_{i,t} \times Size_{i,t-1}$ = Interaction of month of July with market value of security *i* at time *t-1;*

$Market_t$ = Excess market return[††] of the KSE-100 index at time *t*; and

$R_{i,t-12}$ = 12-month lagged return of security *i* for checking potential momentum effect.

Model / Research Hypothesis

This study primarily investigates following hypotheses:

Hypothesis 1: Size of the firm has a significant impact on the excess stock returns.

Hypothesis 2: Size of the firm has a significant effect on the stock returns after controlling for firm specific characteristics.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 1 presents the descriptive statistics of the variables used in our analysis. In Table 1, excess monthly stock return ranges from -94.41% to 202.32% with mean value of 0.81%, median -1.01% and standard deviation of 17.91%. The size of the firms in the sample ranges from PKR 0.365 million to 1,202.54 billion with mean value of PKR 17.24 billion, median is PKR 1.94 billion and standard deviation of 57.14 billion.[‡‡] Furthermore, excess market return ranges from -38.63% to 20.76% with mean value of 0.42%, median of 1.21% and standard deviation of 6.98%.

Table 1: **Descriptive Statistics**

This Table explains the descriptive statistics for the variables used in this study. Panel A explains mean, median, standard deviation, maximum and minimum values for the following variables: $r_{i,t}$, the monthly excess return of the firm *i* at time *t*; $Size_{i,t}$; natural logarithm of current market capitalization of security *i* at time *t* (in million rupees); and $Market_t$; excess market return of the KSE-100 index at time *t*; These descriptive statistics are calculated over the entire sample period i.e., January-2007 through November-2018.

Descriptive Statistics

[††] Similarly**,** monthly market return is calculated by current month ending value of KSE-100 index minus previous month ending observation of KSE-100 index divided by previous month ending value of KSE-100 index; then excess market return is calculated by subtracting monthly market return from State Bank of Pakistan policy rate (i.e., discount rate).

[‡‡] Due to high positive skewness of market capitalization (size) of listed firms in Pakistan, we have taken natural logarithm of size for further analysis in accordance with finance literature to reduce the influence of outliers and make the distribution of the data approximately normal.

Variables	Mean	Median	Std. Dev	Max	Min
$r_{i,t}$	0.0081	-0.01008	0.1791	2.0232	-0.9441
$Size_{i,t}$	17,241.88	1,937.58	57,143.76	1,202,538	0.3647
$Market_t$	0.0042	0.0121	0.0698	0.2076	-0.3863

Next, to check the issue of multicollinearity before running linear regression model/(s), the Table 2 details the correlation matrix of the variables that has been used in regression analysis. Table 2 reveals that problem of multi-collinearity does not exist in the sample data, as the correlation among the independent variables is very low and therefore, we can safely estimate the financial equations.

Table 2: **Correlation Matrix.**

This Table explains the correlation matrix for the variables included in the regression analysis. Variables that used in this matrix are as follows: $r_{i,t}$, the monthly excess return of the firm *i* at time *t*; $Size_{i,t-1}$; natural logarithm of current market capitalization of security *i* at time *t*-1; $Market_t$; excess market return of the KSE-100 index at time *t*; and $R_{i,t-12}$; 12-month lagged return on security *i; LSP*$_{i,t-1}$ stands for penny stock with price equal to or less than PKR 5.00;.*Jan* and *Jul* represents dummy variables for observations equal to one for the month of January and July, and otherwise zero.

	$r_{i,t}$	$Size_{i,t-1}$	$Market_t$	$R_{i,t-12}$	$LSP_{i,t-1}$	*Jan*	*Jul*
$r_{i,t}$	1.0000						
$Size_{i,t-1}$	-0.0436	1.0000					
$Market_t$	0.2833	-0.0163	1.0000				
$R_{i,t-12}$	0.0081	-0.0010	-0.0030	1.0000			
$LSP_{i,t-1}$	0.0545	-0.5222	0.0358	-0.0055	1.0000		
Jan	0.0365	-0.0031	0.0661	0.0199	-0.0038	1.0000	
Jul	0.0324	0.0004	0.0532	0.0041	0.0041	-0.0923	1.0000

Regression Analysis Results

Table 3 outlines the results of examining the firm size effect on stock return. We begin with Pooled Ordinary Least Squares Regression (POLS), it explains firm size has negative and significant effect on stock return. Similarly, in Fixed-effects regression, firm size has negative and significant effect on stock return; that explains that smaller the firm size higher will be the excess return. This finding is consistent with previous studies by Fama and French (2012) in America, Europe, Japan and Asia pacific; in Australian Stock Exchange by Bettman, *et al*. (2011); and in Hong Kong by Ho *et al*. (2000). However, this result is an initial signal that securities of small firms earn higher risk-adjusted return compared to the securities of large firms. Moreover, after controlling for excess market return and momentum effect, we still observe that firm size effect is substantial by generating excess monthly stock returns for investors. Besides, excess market return has significantly positive association with excess stock return and the coefficient of 12-month lagged returns shows positive effect at the 10% level on the excess stock return for POLS and insignificant effect for fixed-effect regression analysis. The evidence of control

variables is somewhat consistent with the findings of Bettman *et al*. (2011) on Australian stock market.

Table 3: **Base Model Regression Analyses**

This Table reports the outcome of regression analysis using Pooled Ordinary Least Squares (POLS), and Fixed-Effects with robust standard errors from Equation (1). Excess monthly stock return is dependent variable and independent variables are defined as follows: $Size_{i,t-1}$; natural logarithm of current market capitalization of security *i* at time *t-1*; $Market_t$: excess market return of the KSE-100 index at time *t*; and $R_{i,t-12}$: 12-month lagged return on security *i*. Robust *t*-statistics are presented below in parenthesis. Results are performed over the sample study period from January-2007 to November 2018.

Equation # 1 (Dependent variable: Excess monthly stock return)

	POLS	Fixed-effects Regression
Constant	0.0262	0.1267
	(6.79)***	(12.28)***
$\boldsymbol{Size_{i,t-1}}$	-0.0029	-0.0162
	(-6.27)***	(-12.05)***
$\boldsymbol{Market_t}$	0.7787	0.7668
	(23.68)***	(22.73)***
$\boldsymbol{R_{i,t-12}}$	0.0262	0.0120
	(1.82)*	(1.09)
Number of observations	38,382	38,382
$\boldsymbol{R^2}$	0.0818	0.0859

*, **, *** Significant at the 10%, 5%, and 1% level respectively.

After the base model estimations, Table 4 explains the firm size effects after controlling for the month effects, namely January and July, on stock returns. This table also includes dummy variable to examine the impact of firms on returns whose share price is less than or equal to Rs. 5.00; as the change in price of penny stocks may exacerbate return calculations. Results suggest that firm size effect significantly explains the excess stock returns, even after controlling for varied variables. Both January and July have positive and significant effect on excess stock returns that implies that both foreign and domestic investors incur capital losses by selling stocks at the end of US and Pakistan fiscal year respectively, (i.e., December and June) to reduce their tax liabilities and repurchase shares in January and July (for example, Henker & Paul, 2012).

The impact of firm whose share price is less than or equal to Rs.5.00 has positive and significant effects on stock return because lower share price does not necessarily entail lower risk adjusted returns (for example, Goyal, 2017). The results are consistent for both the POLS and fixed-effect regression model. This finding is also consistent with finding of Bettman *et al*. (2011) and Henker & Paul (2012) on Australian stock market.

Table 4: **Regression Analyses with Controls**

This Table reports the outcome of regression analysis using Pooled Ordinary Least Squares (POLS) and Fixed-Effect with robust standard errors from Equation (2). Excess monthly stock return is dependent variable and independent variables are defined as follows: $Size_{i,t-1}$: natural logarithm of current market capitalization of security *i* at time *t-1*; $Market_t$: excess market return of the KSE-100 index at time *t*;

and $R_{i,t-12}$: 12-month lagged return on security *i*. $LSP_{i,t-1}$ is *a* dummy variable indicating stocks that have a share price of less than or equal to Rs. 5.00. $Jan_{i,t}$ is a dummy variable indicating 1, if the observation occurs in January; $July_{i,t}$ is a dummy variable indicating 1, if the observation occurs in July, otherwise zero. Robust *t*-statistics are presented below in parenthesis. Results are performed over the entire sample period, namely January-2007 to November 2018, inclusive

Equation#2 (Dependent variable: Excess monthly stock return)

	POLS	Fixed-effects Regression
Constant	0.0112	0.0889
	(3.22)***	(9.39)***
$\boldsymbol{Size_{i,t-1}}$	-0.0016	-0.0123
	(-3.69)***	(-9.84)***
$\boldsymbol{Market_t}$	0.7701	0.7567
	(23.24)***	(22.29)***
$\boldsymbol{R_{i,t-12}}$	0.0015	-0.0023
	(1.78)*	(1.06)
$\boldsymbol{LSP_{i,t-1}}$	0.0381	0.0454
	(3.17)***	(5.97)***
$\boldsymbol{Jan_{i,t}}$	0.0479	0.0494
	(3.36)***	(3.47)***
$\boldsymbol{July_{i,t}}$	0.0127	0.0129
	(4.03)***	(4.52)***
Number of observations	38,382	38,382
$\boldsymbol{R^2}$	0.0832	0.0881

*, **, *** Significant at the 10%, 5%, and 1% level respectively.

Finally, in the last Equation (equation 3) independent variable firm size interact with dummy variables of turn of the month effects namely January, July and also with dummy variable of firms whose share price is less than or equal to Rs. 5.00 (i.e., low price firms). Results indicate that small firms at the Pakistan Stock Exchange have positive and significant effect when it interacts with dummy variable of the firms with lower price. This implies that low-priced small firms do not necessarily earns higher returns. The result is consistent with the study of Bettman *et al*. (2011). Further, both January and July have significantly positive effects when they interact with size that shows turn of the month effect does not vanishes when the month returns are interacted with size, hence, empirically / statistically, power of firm size is not influencing the turn of the month effects (see for example Bettman, *et al*. 2011).The interaction of firm size with month effect also confirms the findings of Henker & Paul (2012), that retail investors cannot be blamed for January or July effect. Overall, the two columns in Table 5 with different regression models show qualitatively same evidence and confirms the robustness of our results. That is, even after incorporating variety of factors and interaction terms, as control variables, that might impact our primary relationship between firm size and stock returns, we find that firm size is significantly explaining risk-adjusted returns and this effect has not diminished by adding different controls.

Table 5: **Regression Analyses with Interaction Terms**

This Table reports the outcome of regression analysis using Pooled Ordinary Least Squares (POLS), firm Fixed-Effect with robust standard errors from equation (3). Excess monthly stock return is dependent variable and independent variables are defined as follows: $Size_{i,t-1}$ is natural logarithm of

current market capitalization of security *i* at time *t*-1; $Market_t$ is excess market return of the KSE-100 index at time *t*; and $R_{i,t-12}$; 12-month lagged return on security *i*. $LSP_{i,t-1} \times Size_{i,t-1}$ is *a* dummy variable indicating interaction of stocks that have a share price of less than or equal to Rs. 5 and natural logarithm of current market capitalization of security *i* at time *t*-1. $Jan_{i,t} \times Size_{i,t-1}$ is a dummy variable that indicating interaction of natural logarithm of current market capitalization of security *i* at time *t*-1 and the observation that occurs in January; $July_{i,t} \times Size_{i,t-1}$ is a dummy variable that indicating interaction of natural logarithm of current market capitalization of security *i* at time *t*-1 with the observation that occurs in July. Robust t-statistics are presented below in parenthesis. Results are performed over the entire sample period, namely January-2007 to November 2018, inclusive.

Equation#3 (Dependent variable: Excess monthly stock return)

	POLS	Fixed-effects Regression
Constant	0.0212	0.1096
	(6.11)***	(11.70)***
$Size_{i,t-1}$	-0.0027	-0.0146
	(-5.97)***	(-11.74)***
$Market_t$	0.7710	0.7584
	(23.48)***	(22.54)***
$R_{i,t-12}$	0.0020	0.0022
	(1.77)*	(1.06)
$LSP_{i,t-1} \times Size_{i,t-1}$	0.0016	0.0029
	(3.50)***	(4.33)***
$Jan_{i,t} \times Size_{i,t-1}$	0.0014	0.0023
	(3.15)***	(3.75)***
$July_{i,t} \times Size_{i,t-1}$	0.0017	0.0017
	(4.14)***	(5.17)***
Number of observations	38,382	38,382
R^2	0.0828	0.0872

*, **, *** Significant at the 10%, 5%, and 1% level respectively.

CONCLUSION

Presence of firm size effect is frequently recognized within the scope of finance literature (for example, Banz, 1981; Bettman, *et al*., 2011; Henker & Paul, 2012). This research examines whether the impact of size on excess stock returns in companies listed within Pakistan stock exchange is statistically significant or not? Monthly data of 341 listed firms have been obtained. Monthly closing stock price, month end value of current market capitalization of the firms, month end KSE-100 index values and State Bank of Pakistan (the central bank) monetary policy rate are the main variables used in this study. Pooled Ordinary Least Squares (POLS) and firm Fixed-Effects (FE) regression analysis is conducted to examine the firm size effect / existence of size effect.

Evidence suggests that size of the firm has negative and significant impact on stock returns. This behavior is consistent with the previous broad literature and implies that firm size effect also exists in Pakistani equity market. The evidence suggests that large capitalized firms have, on average, lower risk-adjusted returns and vice versa. Excess Market return have positive impact on the stock's return which

explains that market returns influence the stock returns in Pakistan (i.e., synchronizing effect in emerging markets). 12-month lagged return also show weakly positive significant impact on stock returns, suggesting existence of momentum to a certain extent, and the results are broadly consistent with prior literature (for example, Banz, 1981; Bettman, *et al*., 2011; Fama and French, 2012, 2008, 1995).
Moreover, inclusion of dummy variables like price of the firm less than or equal to Rs. 5.00 did make positive impact on stock returns. Similarly, dummy variables of month of January and July have an impact on stock returns; these results show consistent evidence with previous studies (for example, Henker & Paul, 2012; Keim, 1983). The turn-of-the-month higher abnormal returns confirms the tax-loss selling effect (for example, Gaunt, *et al*., 2000). Lastly, when the dummy variable of lower share price interacts with firm size, surprisingly the paper documents positive and significant impact on risk-adjusted returns. This means that penny stocks do not necessarily earns higher returns, but small capitalized firms impact excess returns. Lastly, the implication of this research is that investors can adopt 'buy-and-hold' strategy in small firm stocks for medium to long-term to earn higher risk adjusted returns.

Limitations and Areas for further research

The two limitations of our study are: a) sample period studied is up to November 2018; and b) security-wise circuit breakers enhanced from 5% to 7.5% with effect from January 2020.[§§] Therefore, it would be interesting to investigate the firm size premium puzzle by extending / including the recent data, especially after the enhancement of price limits / bands in the PSX. Moreover, this study examines the presence of size premium by taking firm level monthly observations from an emerging economy of Pakistan. In future, researchers can investigate this phenomenon by taking daily or high-frequency tick-by-tick data to extend the frontiers of existing knowledge (i.e., impact of firm size on daily abnormal returns). Similarly, data can be segregated into quintiles based on market capitalization to test the magnitude and stability/significance of the size premium.

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[§§] See 140430-1.pdf (psx.com.pk)

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