Basing Portfolio Investment Decisions on P/E Premium and Expected Returns in Pakistan's Equity Market

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Abstract

This paper examines the relationship between P/E ratios and investment performance of equity securities in Karachi Stock Exchange (KSE) which is the national stock exchange of Pakistan having more than 600 listed companies, comprising 34 sectors of the economy. Stock price data for June 2012-July 2017 has been used to test the intended relationships. Securities for each year were sorted on the basis of price to earnings (P/E) ratio and two portfolios were constructed, each comprising 30 percent securities on the basis of highest and lowest P/E ratios. The difference between returns of two portfolios provided P/E premium. Further, to test the relationship between P/E ratio premium and equity market return, the portfolio returns were regressed against market premium and P/E premium. The results indicate that low P/E portfolios, on average, earned higher absolute and risk-adjusted rates of return than the high P/E securities. The results reported in this paper are consistent with the view that P/E ratio information was "fully reflected" in security prices in as rapid a manner as postulated by the semi-strong form of the efficient market hypothesis. However, the behavior of security prices over the 7-year study period does not support the efficient market hypothesis. This study also indicates that the returns on growth stock (high P/E ratio) often lag behind those of value stocks (low P/E ratios). Therefore, investors can design the investment strategies on the basis of behavior of growth stock as well as value stock for enhancing their long-term performance.

Keywords: Asset Pricing, P/E Premium, Market premium, KSE, CAPM, APT

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1.   INTRODUCTION

Capital asset pricing Model (CAPM), according to research studies on asset pricing, has two interrelated difficulties to be tested empirically. One of these difficulties is that the expectations of return on the market portfolios of particular assets are unobservable forward-looking variables that may be approximated by rolling averages of past returns. Moreover, the averaging of observations assumes that returns are normally distributed and, as returns are, in fact, non-normally distributed; simply averaging these will lead to biased estimates of expected returns. The second difficulty is that the market portfolio is itself unobserved, and any proxy chosen (FTSE-100 or KSE 100 index) can only be considered an approximation at best. Indeed, even if one had precise estimates of all traded assets' expected returns and betas, in order to have access to all risky assets under the CAPM's assumptions one should include non-marketable assets such as human capital. These are hard to quantify and their absence also induces biases in testing procedures. Tests of CAPM have indicated that the beta coefficients for individual securities are not stable but that portfolio betas generally are stable, assuming long enough sample periods and adequate trading volumes. It is, therefore, possible to use knowledge of certain firm or security characteristics to develop profitable trading strategies, even after adjusting for investment risk as measured by beta.

There has been mixed support for a positive linear relationship between rates of return and systematic risk for portfolios of stock as evidenced by studies conducted by Fama, French (1998) and Ross (1976) indicating the need for considering additional risk variables or proxies, thus, leading one to Arbitrage Pricing Theory (APT) that studies multiple factors of different combination of risk behaviors.

In an efficient capital market, security prices fully reflect available information in a rapid and unbiased fashion and thus provide unbiased estimates of the underlying values. While there is substantial empirical evidence supporting the efficient market hypothesis, many still question its validity. One such group believes that price-earnings (P/E) ratios are indicators of the future investment performance of a security. Proponents of this price-ratio hypothesis claim that low P/E securities will tend to outperform high P/E stocks. In short, prices of securities are biased, and the P/E ratio is an indicator of this bias. A finding that returns on stocks with low P/E ratios tend to be larger than warranted by the underlying risks, even after adjusting for any additional search and transactions costs and differential taxes, would be inconsistent with the efficient market hypothesis (EMH).

2.   LITERATURE REVIEW

Basu (1977) discuss the empirical relationship between investment performance of equity securities and their P/E ratios. While the efficient market hypothesis denies the possibility of earning excess returns, the price-ratio hypothesis asserts that P/E ratios, due to exaggerated investor expectations, may be indicators of future investment performance. Based on data for the period April 1957 to March 1971, Basu observed that low P/E portfolios seem to have, on average, earned higher absolute and risk-adjusted rates of return than the high P/E securities. Basu used regression analysis to determine

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the relationship between P/E ratio and stock market and the results are consistent with the view that P/E ratio information was not "fully reflected" in security prices in as rapid a manner as postulated by the semi-strong form of the efficient market hypothesis. Instead, it seems that disequilibria persisted in capital markets during the period studied. Securities trading at different multiples of earnings, on average, seem to have been inappropriately priced vis-a-vis one another, and opportunities for earning "abnormal" returns were afforded to investors.

Nancy Beneda (1992) examined the returns of growth stocks vs. value stocks over the long term, from the end of 1983 to 2001. Results indicate that over the first five years after portfolio formation, the performance of the growth stocks lagged behind that of the value stocks. At the fifth year after portfolio formation, the value stocks outperformed the growth stocks for all portfolio formation years except 1983. At the tenth year after portfolio formation, growth stocks outperformed the value stocks for all portfolio formation years except 1987. At the 14th year, the growth stocks outperformed the value stocks for all five of the portfolio formation years. These results tend to support the EMH and suggest that P/E ratios reflect the investor's perception about the future growth opportunities.

Ferson and Harvey (1996) provides a global asset pricing perspective on the debate over the relation between predetermined attributes of common stocks, such as ratios of price-to-book value, cash flow, earnings, and other variables to the future returns. They present an empirical framework for attacking the problem at a global level, assuming integrated markets. Their perspective pulls together the traditional academic and practitioner viewpoints on lagged attributes, providing potential benefits from each viewpoint. They presented new evidence using monthly data for 21 national equity markets. Results find that the explanatory power of some attributes, such as price to- book is related to global market risk-exposure. The predetermined attribute data present a powerful challenge for future research on global asset pricing models.

Aydogan, Gürsoy (2000) showed that variables such as dividend yields, P/E ratios, book-to-market ratios as well as past returns have significant explanatory power for the variation in cross section of expected returns in emerging equity markets. Study used the ratio of earnings to price or E/P ratio for the 1986-99 periods and found that variation across countries and within country for all variables was remarkable. Results indicated that simple average monthly dollar rate of return in emerging equity markets was 1.3 percent with a standard deviation of 12.2 percent. However, in developed capital markets, it was found to be 0.83 percent and 4.24 percent respectively. Also average returns decreased as E/P ratio declines. In other words, an investor is more likely to attain higher returns if he invests in a market where E/P ratio is relatively high. The average returns horizons are negative after observing a low E/P value. Study indicates that the relationship is much stronger for longer horizon returns. The difference in 12 month returns for high and low E/P quintiles are more pronounced than the difference in 3-month future returns.

Jain and Rosett (2001) examine the annual E/P ratio at the economy level for the period

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starting from 1952 until 2000. Their results show associations between the E/P ratio and real interest rate, expected growth in real GDP, index of consumer sentiment and two proxies for economy-wide risks. The data covers a longer time period than previous studies and divides the time period into three sub periods roughly representing different underlying regulatory and economic environments. Their results, across the three sub-periods, are not consistent with one another: The association between expected (or realized) inflation and the E/P ratio is significantly negative in the first sub period and significantly positive in the third sub period. They conclude that the observed association between the earnings-to-price ratio and inflation may be spurious.

Prem and Joshua (2006) examined the economy wide E/P ratio both over a long time period (1952–2003) and for sub periods, keeping in view two main objectives. First, reexamining the puzzling result documented by Modigliani and Cohn (1979), who found that, contrary to theory, the economy wide E/P ratio and inflation were positively correlated. They found that the Modigliani and Cohn anomaly is period specific. The association between the E/P ratio and inflation reverses from one period to another. Hence, the relation between inflation and the economy wide E/P ratio is not stable over a long time period. Second, analyzing the associations between the economy wide E/P ratio and its two main drivers as given by the Gordon (1962) model, they observed that the economy wide E/P ratio was not associated with the real interest rate and weakly negatively associated with the expected growth rate.

Mahmood, Mansor, Fatah, and Syuhada (2017) examined the relationship among stock market returns, dividend yields and price earnings ratio in Malaysia. Specifically, they examined the existence of long and short term relationship and also their predictive power (causality) between and among market stock return, dividend yields and price earnings. Using the monthly data from 1989-2005, the study found that all these fundamental variables have a strong long term relationship. For short term, the results showed significant positive predictive power from dividend yield to stock return and significant negative relation from stock returns to P/E ratios. Besides, applying multivariate causality test, the results showed that both dividend yields and P/E ratio Granger cause (predict) the stock return. Similar results were found from stock returns and P/E ratio to dividend yield, as well as from dividend yield and stock returns to P/E ratio but with lesser magnitude. Thus, fundamental variables are an important source of information in determining stock market returns and useful to investors and other market participants in deciding their investment strategies.

Wan-Ting Wu (2009) examined the association between the price-to-forward earnings ratio (i.e., the forward P/E ratio) and subsequent realized growth. Investment practice, as well as an elementary model like the constant growth model, suggests that the forward P/E ratio depends on expected growth and risk. If investors' growth expectations are rational, a positive correlation should be observed between the forward P/E ratio and subsequent realized growth, holding risk constant. Wu observed a nonlinear relationship between the forward P/E ratio and subsequent realized growth, whether risk is held constant or not. While firms in the highest forward P/E portfolio are most able to deliver extremely high growth, they also report losses the most frequently. His findings suggest a U-shaped

relationship between the forward P/E ratio and volatility of earnings growth as compared to firms in the lowest forward P/E portfolio, which are inherently financially distressed, firms in the highest forward P/E portfolio are more likely to report losses and have higher volatility of earnings growth.

The review of literature presented above clearly indicates the use and applicability of P/E premium in determining the returns on portfolios and, thus, serving as a useful tool for better investment decisions. However, in the absence of any study available on this subject in Pakistan, the question arises whether P/E premium is equally appropriate and useful tool for guiding investment decisions in the Pakistani equity market or not. This paper, therefore, is a pioneering research on the subject issue as it focuses on testing of APT in the equity market in Pakistan.

3.   Data Description and Methodology

For this research, that investigated the relation between P/E premium of common stock and equity market returns under Arbitrage Pricing Theory framework, stock price data for June 2012-July 2017 was used. The data was obtained from the Business Recorder and KSE Databases, which are reliable sources of data in Pakistan. This research covered ten important sectors of Pakistan's economy that included Textile Weaving, Synthetic & Rayon, Jute, Cement, Cables & Electric Goods, Chemicals, Leather & Tanneries, Sugar, Tobacco and, Pharmaceuticals. For any given year under consideration, three parameters were used for inclusion of a firm in the sample: firstly, the companies should have eight calendar months trading history in a particular year at the KSE and secondly, the relevant investment return and financial statement data were available for the study period. Based on this criterion, the number of firms that qualified for the final analysis ranged between 127 and 153 for each year of the study period.

APT assumes that the stochastic process generating asset returns can be represented as a K factor model of the form:

$$R_{it} = a_i + [b_{i1}F_{1t} + b_{i2} F_{2t} + \ . \ . \ . \ + b_{iK} F_{Kt}] + e_{it}$$

Where:
Fjt is the period t return to the jth-designated risk factor
Rit can be measured as either a nominal or excess return to security i.

However, APT does not identify the factors that contribute the return generating process. A number of factors have been studied in various parts of world as discussed in the review above. This study employed a two-factor model developed to capture the role of price earning multiple and market premium in determining the equity returns/prices. This methodology is in line with famous three-factor model proposed by Fama and French (1992) and four-factor model proposed by Carhart (1997). The algebraic representation of model is as under.

$$R_{if} = R_f + B_1 \text{ (Market Premium)} + B_2 \text{ (P/E premium)}$$
$$R_{if} = R_f + B_1 (R_m - R_f) + B_2 (R_{p \text{ last 30percent}} - R_{p \text{ top30percent}})$$

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This equation was used to calculate the effect of risk premium and the market portfolio. In order to construct the variable P/E premium, P/E ratio of every sample-security was computed at June 30, by dividing market price per share (MPS) by earnings per share (EPS). Here, MPS was taken from the KSE and Business Recorder databases and EPS was calculated by dividing profit after tax by number of shares outstanding. The data for profit after tax and number of outstanding shares was taken from the Karachi Stock Exchange databases.

Each year securities were sorted on the basis of P/E ratio and two portfolios were constructed: one, comprising of 30 percent securities on the basis of highest P/E ratio and the other, consisting of 30 percent securities on the basis of lowest P/E ratio. Once portfolios were formed, monthly returns for each portfolio were calculated by using arithmetic mean of all securities included in a respective portfolio. This step resulted in monthly returns for portfolios of high as well as low P/E ratio companies. The difference between returns of two portfolios provided P/E premium.

In order to test the relationship between P/E ratio premium and equity market return, ten portfolios were created for each year on the basis of P/E ratios. These portfolios were named as P_1, P_2,…………, P_{10}: where, P_1 portfolio comprised of companies with highest P/E ratio and P_{10} portfolio comprising of companies with lowest P/E ratio. Portfolios were constructed for each of the six years study period.

Finally, each portfolio returns were regressed against market premium and price earning premium to explore the relationship. The data has been tested for the period 2012 – 2017. The relationship has also been investigated for sub periods 2012-2014 and 2014-2017 to confirm the consistency of results. The statistical properties of the portfolios have also been explored by employing descriptive statistics. Similarly, in order to observe the relationship among variables, correlation analysis was performed between market premium and P/E premium and portfolio returns.

4   Empirical Results
The results of sixty portfolios that were constructed to explore the investment performance of equity stocks with emphasis on P/E ratio and market premium for the study period are presented under the following sub-sections:

Descriptive Statistics for Portfolio Returns

   Table 1. Descriptive Statistics for Portfolio Returns for 2012 –2017

| Descriptive Statistics	Returns on Portfolios									
	Rp 1	Rp 2	Rp 3	Rp 4	Rp 5	Rp 6	Rp 7	Rp 8	Rp 9	Rp 10
Mean	0.035	0.021	0.037	0.029	0.029	0.034	0.027	0.035	0.021	0.015
Median	0.024	0.013	0.027	0.015	0.023	0.020	0.027	0.024	0.013	-0.002
Mode	-0.008	-0.022	-0.047	0.035	0.046	-0.013	-0.015	-0.008	-0.022	-0.022

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Std Deviation	0.073	0.037	0.124	0.079	0.057	0.059	0.049	0.073	0.037	0.070
Variance	0.005	0.001	0.015	0.006	0.003	0.003	0.002	0.005	0.001	0.005
Range	0.374	0.179	0.530	0.386	0.233	0.296	0.244	0.374	0.179	0.309
Minimum	-0.074	-0.084	-0.250	-0.157	-0.084	-0.088	-0.091	-0.074	-0.084	-0.186
Maximum	0.300	0.095	0.280	0.229	0.149	0.208	0.153	0.300	0.095	0.123

The combined descriptive statistics for all portfolio returns, as shown in Table 1, reveals that the mean for top 30 percent companies was increasing, whereas, for the bottom 30 percent companies it was decreasing indicating fluctuations in the earning potential of the company's shares between the selected portfolios of firms. Standard Deviation indicates that deviations from the mean returns are increasing for the top 30 percent companies while there was slight volatility in the deviations from the mean for bottom 30 percent portfolios. Variance of return on portfolios was found to be low both for the top 30 percent and bottom 30 percent portfolios.

Figure 1. *Returns on Portfolios*
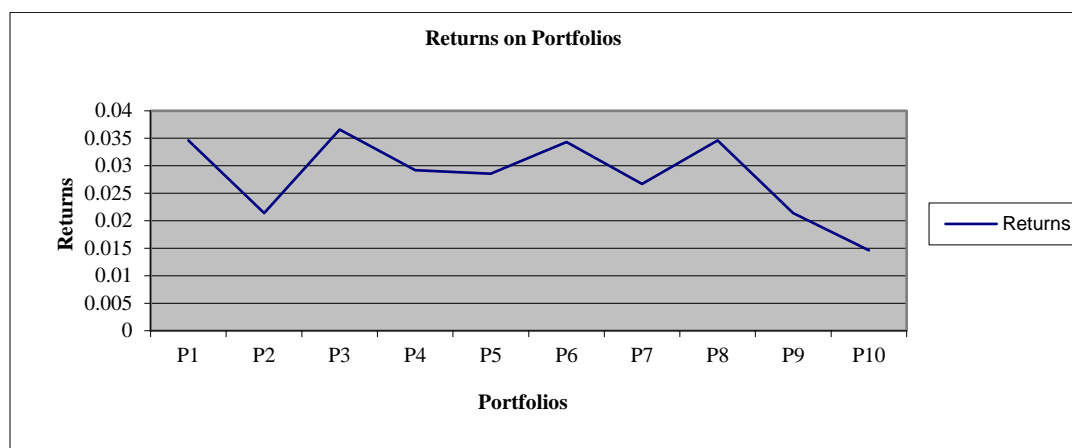
In the above Figure, portfolios and their returns are presented which signify the relationship between the portfolios created for the years 2012 to 2017 indicating that the returns are positively related to each other.

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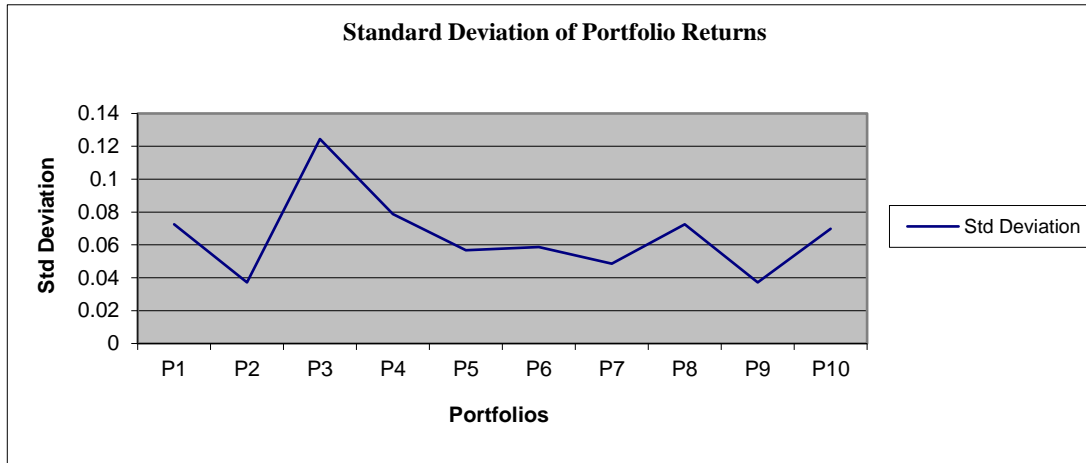**Figure 2.** *Standard Deviation of Portfolio Returns*

Figure 2 shows the relationship between the portfolios created for the year 2012 to 2017 shows that the risk associated with the returns of portfolios was positively related to each other. The mean for market premium (Rm-Rf) for top 30 percent companies was constant over the five-year portfolios formation period with respect to bottom 30 percent portfolios. The standard deviation is also constant across the board for selected portfolios meaning the deviations from the mean are slightly positive in nature. Variance, which is the risk, is also constant for the selected portfolios and there is no change in the risk profile of the selected companies on the basis of P/E ratios.

Correlation Analysis for Portfolio Returns

The summary results of correlation analysis for all portfolios for the period 2012 –2017 are shown in Table 2 below:

Table 2. Summary Correlation Analysis for 2012-2017

Statistic	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P/E Premium	0.793	0.825	0.779	0.689	0.271	0.418	0.489	- 0.268	0.322	0.317
Rm-Rf	0.221	0.159	0.299	0.095	- 0.038	0.105	0.072	0.039	0.109	0.172

The above Table indicates that for ten decile portfolios P/E premium was positive except for 8th decile portfolio, which was negative. Market premium for the ten portfolios were all positively correlated except for 5th decile portfolio, which was negative.

Regression Analysis for Portfolio Returns
The regression analysis for the estimated portfolios of 2012-2017 is presented in Table 3

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Table 3.   Regression Analysis for Period 2012-2017

Statistic	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P/E Premium	0.948	0.879	1.294	0.764	0.229	0.337	0.334	-0.292	0.161	0.285
t-statistic	9.504	10.811	9.074	7.145	2.250	3.369	4.202	-0.292	2.442	2.307
P-Value	**2.3E-13**	**2E-15**	**1.2E-12**	1.8E-09	**0.028**	**0.001**	9.4E-05	**0.030**	**0.018**	**0.025**
Rm-Rf	0.007	-0.007	0.115	-0.026	-0.037	0.007	-0.010	0.047	0.011	0.050
t-statistic	0.137	-0.192	1.715	-0.525	-0.764	0.147	-0.262	0.768	0.341	0.872
P-Value	0.891	0.848	0.092	0.602	0.448	0.884	0.794	0.445	0.734	0.387

Table 3 indicates that P/E premium was positively related with equity returns for all portfolios except portfolio 8. The relationship was found to be significant for all P/E sorted portfolios. So it can be safely said that Karachi stock market prices the P/E ratio.

The t-statistic for market premium was positive for six but negative for four portfolios created for the study period. The P-value's for market premium for the ten portfolios created from 2012 to 2017 are all positive and greater than the significance level (0.05). Therefore, insignificant relationship exists between market premium and portfolios returns. This questions the validity of CAPM. Similarly, as abnormal returns can be earned by using trading rules it also violates the EMH. These results are consistent with recent work done on market efficiency in Pakistan by Hasan, Abdullah and Shah (2017). Robustness of above results was also observed for the sub periods: 2012-2014 and 2014-2017.

Regression Analysis for Sub Period I
        Table 4. Regression Analysis for Sub Period 2012-2014

Statistic	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P/E Premium	0.932	0.868	1.109	0.811	0.252	0.293	0.307	-0.396	0.140	0.171
t-statistic	5.052	5.901	4.433	4.499	1.404	1.728	2.141	-1.768	1.212	0.874
P- Value	**0.000**	**0.000**	**0.000**	**0.000**	0.175	0.099	**0.044**	0.092	0.239	0.392
Rm-Rf	0.120	0.055	0.268	-0.001	0.001	0.106	0.047	0.161	0.058	0.220
t-statistic	1.369	0.778	2.247	-0.011	0.012	1.311	0.679	1.509	1.060	2.349
P-Value	0.186	0.445	**0.035**	0.992	0.991	0.204	0.505	0.146	0.301	0.029

In table 4, P/E Premium, calculated t-value was greater than tabulated value (2.06) for P1, P2, P3, P4, P7, so there existed a significant relationship between P/E premium and portfolio returns. The P-value's (bold numbers) for P/E premium are all below the significance level of 0.05 for portfolios (created from 2012 to 2014) indicating that significant relationship exists between P/E premium and returns. All other P-values are greater than alpha= 0.05, so insignificant relationship also exists.

For market premium, calculated value was greater than tabulated value for all portfolios except P3 and P10, which indicates that significant relationship exists for P3, P10 and is

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insignicant for all others. The P-value's for market premium were greater than the significant level of 0.05 indicating that no relationship existed between market premium and returns. This result also questions the validity of CAPM in Pakistan's Equity Market.

Regression Analysis for Sub Period II
      Table 5. Regression Analysis for Sub Period 2014-2017

Statistic	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P/E Premium	0.958	0.846	1.370	0.717	0.189	0.317	0.312	-0.265	0.15402	0.285
t-statistic	7.471	8.671	7.960	5.089	1.458	2.517	3.294	-1.603	1.855	1.818
P-value	1.4E-08	5.1E-10	3.5E-09	1.4E-05	0.154	0.017	0.002	0.118	0.073	0.078
Rm-Rf	-0.039	-0.100	0.112	-0.015	-0.074	-0.060	-0.140	0.018	-0.006	-0.039
t-statistic	-0.356	-1.210	0.766	-0.128	-0.671	-0.557	-1.740	0.127	-0.082	-0.295
P-value	0.724	0.235	0.449	0.899	0.507	0.581	0.091	0.900	0.935	0.770

In table 5, P/E Premium, calculated value is greater than tabulated value (2.06) for P1, P2, P3, P4, P7, so there existed a significant relationship between P/E premium and portfolios returns. The P-value's for P/E premium were less than the significant level of 0.05 for all portfolios (except for P5, P8 to P10) created from 2014 to 2017 indicating that the hypothesized value should be accepted for this period of analysis.

P/E premium was significantly related to equity returns for all of the ten portfolios created for 2014-2017. The P-value's for market premium were greater than the significant level of 0.05 for all portfolios (created from 2014 to 2017) indicating that P/E premium are positively related to their equity returns.

5. Conclusions
An attempt has been made, in this paper, to empirically determine the relationship between investment performance of equity securities and their P/E ratios, using the APT model, in Pakistan's stock market. Based on the data analyzed in this study, it is concluded that there exists a positive relationship between P/E sorted portfolios and market return in Karachi Stock Exchange (KSE). During the period of study, June 2012-June 2017, the low P/E portfolios seem to have, on an average, earned higher absolute and risk-adjusted rates of return than the high P/E securities.

Although the efficient market hypothesis precludes the chances of obtaining excess returns, the price-ratio hypothesis asserts that P/E ratios may be good indicators of future investment performance. The results reported in this study are consistent with the view that P/E ratio information was "fully reflected" in security prices at KSE.

The behavior of security prices over the study period is, perhaps, not completely described by the efficient market hypothesis. To the extent low P/E portfolios did earn superior returns on a risk-adjusted basis, the propositions of the price-ratio hypothesis on the relationship between investment performance of equity securities and their P/E ratios seem to be valid.

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Contrary to the growing belief that, publicly available information is instantaneously reflected in security prices, there seem to be lags and frictions in this adjustment process. As a result, publicly available P/E ratios seem to possess "information content" and may warrant an investor's attention at the time of portfolio formation or revision.

In addition, returns on growth socks (high P/E ratio) often lag behind those of value stocks (low P/E ratios). In order to truly access the performance of high P/E stock, a long-term horizon assuming a buy and hold strategy must be examined and comparable portfolios be included in the study. It also shows that high P/E stocks are fairly balanced among several industry segments. This means that if investors are interested in holding their portfolios over the long term i.e. incorporating a diverse group of growth stocks mixed with value stocks and middle P/E range stocks into their portfolios may enhance long-term performance.

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