MODELLING EMPIRICAL REGULARITIES FOR BANKING STOCKS IN PAKISTAN

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Abstract

This paper examines empirical regularities in terms of day-of-the-week anomalies for the banking stocks at the Karachi Stock Exchange for the period 1996 to 2008. Non normality of the data with excess kurtosis suggested application of ARCH and GARCH models which proved uncertainty of returns from banking stocks. Nonparametric analysis of the data reveals evidence of day-of-the-week effect in Pakistan as contrary to the findings of some of the previous studies on Asia-Pacific markets. The evidence of the day-of-the-week anomaly might be attributed to the strength of the nonparametric estimation methods which are more robust when the data does not meet assumptions of normal distribution. The study also finds relatively higher risk associated with returns on the last day of the working week in general. Negative skewness for most of the return series indicates probability of yielding loss for investors in the banking stocks. Volatility test proves asymmetric results for various banking stocks. Results of the nonparametric tests also reveal significantly different median returns on various days of the week for these stocks. The study finds out relatively greater risk associated with Faysal Bank, Jahangeer Siddiqui Bank, Meezan Bank, National Bank and Prime Commercial Bank on Mondays. For the days in the middle of the week the risks associated with the banking stocks are not asymmetric. For Friday, the closing day of the week, risk in respect of Bank of Punjab, Faysal Bank, Muslim Commercial Bank and National Bank is significantly large.

Keywords: Day-of-the-week anomaly; Banking; nonparametric tests

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Introduction

An empirical regularity can be described as the situation in which financial variables display a persistent pattern over time. Capital market anomalies are important subsets of the empirical regularities. A capital market anomaly can be defined as a persistently observed capital market phenomenon which is incompatible with accepted finance theory. But not all empirical regularities are anomalies(McKenzie, Brooks, Brailsford, & Faff, 1999). One of the empirical regularities is the day-of-the-week effect. On account of empirical regularities, returns from securities are not independent of day-of-the-week. Holiday effect on the returns of securities may also be considered as an empirical regularity when activities are either very low or very high. Studies show rising index on the week day which follows the public holiday (Condoyanni, O'HANLON, & Ward, 1987; Jaffe & Westerfield, 1985; Theobald & Price, 1984).

However, there are studies (Cheung & ANDREW COUTTS, 1999; Connolly, 1989; Dubois & Louvet, 1996; Keim & Stambaugh, 1984) which found no evidence of day-of-the-week effects. This study investigates day-of-the-week effects, for all the five working days, taking sample of 22 banking stocks in the Karachi Stock Exchange (KSE) by using the nonparametric approach. Additionally it applies normality tests and in order to test volatility of the returns series of these stocks it employs GARCH models.

Parametric analysis, indeed is considered as one of the best analytical approaches when the stringent assumptions of normality and equal variance of the subgroups are satisfied. Nevertheless, real data set usually fail to meet the criteria of normality assumptions. The stock returns in the present study also do not meet the assumptions of normality. Therefore, the present study cannot follow parametric approach on the pattern of the previous studies which have employed the mean-variance criterion or CAPM statistics or parametric approach.

The distribution is not normal and group variances are also not equal for the banking stocks in this study. Therefore, preferably this study employs distribution-free or nonparametric tests. Outliers in the data do not influence the results of the nonparametric tests as significantly as they do in the parametric approaches. The study

employs daily data covering the period of 1996–2008 for the 22 banking stocks of the Karachi Stock Exchange. Findings of the study support the presence of weekday seasonality effects of the banking stocks. Nevertheless, these results cannot be generalized for all the listed stocks.

This paper tests the day-of-the-week regularity in KSE, which is one of the emerging Asian stock markets. The analysis goes in the order of testing normality at the first stage, then applying the GARCH models volatility of the returns series is tested; subsequently it applies nonparametric tools such as Wilcoxon/Mann-Whitney Test, Kruskal-Wallis test, Brown-Forsythe and Levene Test.

Distribution tests reveal negative skewness for most of the return series, indicating probability of suffering losses for the investors in the banking stocks for the sample period of this study. The leptokurtosis may be attributed to the serial correlation in the variance process of returns. Relatively large volatility creates surprises or shocks of either sign or either direction unconditionally. The excess kurtosis over their ideal value of 3 suggests an application of ARCH and GARCH family of modeling to analyze volatility of returns series of the banking stocks. The stocks of Muslim Commercial Bank, National Bank, Soneri Bank, Meezan and FDIBL have been found the most efficiently performing stocks.

Results of the nonparametric test reveal that Bank Al-Habib, ESBL, FDIBL and National Bank have a significantly high median return on Monday, Bank Al-Habib accrues significantly high returns on Tuesday, Muslim Commercial Bank, Orix Investment Bank, PICIC, Faysal Bank and Soneri Bank accrue better returns on Wednesday, Asset Investment Bank and FDIBL reveal better results on Thursday and median returns from the PICIC and Prime Commercial Bank were significantly outperforming other stocks on Fridays. The study finds out relatively greater risk associated with Faysal Bank, Jahangeer Siddiqui Bank, Meezan Bank, National Bank and Prime Commercial Bank on Mondays. For the days in the middle of the week the risks associated with the banking stocks are not asymmetric. For Friday, the closing day of the week, risk in respect of Bank of Punjab, Faysal Bank, Muslim Commercial Bank and National Bank is significantly large.

Following the section of introduction, review of literature is presented in the section 2 in order to explore justification for the application of nonparametric tests in this study. Section 3 of the study constitutes methodology and the outcome of these statistical methods. Section 4 concludes this study in the end.

Literature Review

Estimation of the day-of-the-week effect dates back to Fields (1931) who empirically investigated the Monday effect for the American stock markets. The study finds out US stock market experiencing significantly negative returns on Mondays and significantly positive returns on Fridays. Subsequently many empirical studies (Aggarwal & Rivoli, 1989; Bessembinder & Hertzel, 1993; French, 1980; Gibbons & Hess, 1981; Jaffe & Westerfield, 1985; Keim & Stambaugh, 1984; Lakonishok & Smidt, 1988; Linn & Lockwood, 1988; Siegel, 1998) revealed negative Monday effect for the American equity markets. The studies (Dubois & Louvet, 1996; Tong, 2000) also reveal sensitivity of day-of-the-week effect to the selection of statistical methods employed in the studies. On the recommendation of these studies, application of nonparametric tests have been selected for this study rather than parametric tests.

During 1980s, many empirical studies were conducted on the anomalous regularities due to ever rising volatility in the security markets, financial markets and exchange rate uncertainty. Harris (1986) finds out seasonal regularities related to the time of the day and the day of the week. Ariel (1987) reveals time-of-the-month anomalies. Lakonishok and Smidt (1988) focused on testing the turn-of-the-year anomaly. This study focuses on documentation of day-of-the-week effect on account of data constraints. Many factors leading towards anomalous regularities have been singled out by the previous studies. These factors include cash flows, institutional and cultural factors, and differences in risk on different days of the week and different timings of the day are the factors which may cause anomalies.

The dynamics of Asian Economies are different from the industrially advanced countries. Studies related to the Asian economies provide quite relevant perspective for this study. Literature (Ho, 1990; Koh & Wong, 2000) covering the markets of Hong Kong, Malaysia,

Philippines, Singapore, Taiwan and Thailand reveals negative returns on Monday and Tuesday whereas positive returns on Wednesday-Friday have been revealed. January effect was introduced by Wachtel (1942) as another aspect of looking into the anomaly in the stock returns of the industrially advanced countries. Nassir and Mohammad (1987) and Pang (1988) find support for the January effect in Malaysia and Hong Kong. Later on Ho (1990) found six of the eight emerging Asian markets indicating January effect. Contrary to the findings of these studies, Cheung and Coutts (1999) could not find any evidence of a January effect for the Hong Kong market. Studies (Connolly, 1989, 1991) on stock market data reveal limitations of the OLS assumptions in exploring anomalies. By incorporating large sample size, Connolly (1989) reveals results favoring the null hypothesis of equal returns across days of the week.

The stock markets in Pakistan are not as established, engineered, mechanized and well-equipped as they are in the Asian Tigers such as Hong Kong, Malaysia, Singapore, Taiwan and Thailand. That can be the possible reason for not studying Pakistani secondary markets so extensively. KSE-100 Index in Pakistan was launched in the late 1991 with a base of 1,000 points. However, the KSE-all-share index was introduced in September 1995. Karachi Stock Exchange (KSE) dominates the remaining two markets of Islamabad and Lahore with more than 60% of the trading. This is the justification for choosing the KSE as representative of secondary markets for the current study. The business activities of KSE have been on the increase over the last decade with the number of listed companies increasing from 300 in 1986 to 689 in 2004. KSE was declared as the "Best Performing Stock Market of the World" by "Business Week" in the year 2002. The market grew from 1,770 points to skyrocketed 9,989 points in 2005 and afterwards the index reached level of 12,285 points in February 2007. KSE-100 index reached the highest level of 14,814 points on December 26, 2007. After a tentative dive-down the index once again recovered in the year 2008 when it reached the new heights of 15,500 points in April. Additionally, the number of listed companies increased to 671 on December 20, 2007 with the market capitalization of PKR 4364.312 billion (US $ 73 Billion).

This study employs both parametric and nonparametric tests in order to compare performance of the stocks on different working days of the week. Performance of the banking stocks is assumed to be identical across all the working days of the week in Pakistan. Therefore, irrespective of the day, investors are free to invest and show consistent attitude towards investment in the KSE. This is the proposition of the present study to test.

Empirical Results and Their Analysis

Normality Test

Normality tests are usually applied to explore characteristics of the data set. Measures of central tendency and measures of dispersions including mean, standard deviation, skewness and kurtosis have been employed by this study in order to test normality of the returns series of the banking stocks. The *iid* tests reveal the error distribution which does not depict constant variance of returns from the banking stocks in Pakistan. The ideal value of skewness is zero for the normal curve which is statistically symmetric whereas the kurtosis of the distribution depict the peak of the distribution and thickness of its tails. Most of the returns series show negative skewness. The results are presented in the Table 1 given below for perusal of the readers.

Banks Returns	Mean	Standard Deviations	Skewness	Kurtosis
Asset Investment Bank	0.000304	0.093878	0.211300*	10.07527*
Bank of Punjab	0.000556	0.042742	-0.668891	36.17410*
Bank Al-Habib	0.000350	0.027029	-3.537039	42.07877*
CCBL-Bank	0.000492	0.034843	0.426335	3.927428*
ESBL	-1.03E-05	0.029541	-0.050595	4.140536*
Faysal Bank	0.000226	0.030410	-0.212818	9.220245*
FDIBL	0.001409	0.035968	-0.131954	3.003331
Islamic Bank	-7.13E-05	0.238768	0.482625	196.2805*
Jahangeer Siddiqui Bank	0.000767	0.053941	-9.771472	230.2766*
KASB BANK	0.000682	0.364991	0.148236	290.2979*
Meezan Bank	0.001038	0.028127	-0.591010	10.99559*
Metro Bank	0.000636	0.035030	-2.569075	29.29962*
Muslim Commercial Bank	0.000824	0.031955	-0.152270	13.90031*
National Bank	0.001747	0.025335	-0.613487	7.552928*
NDLC Bank	0.000246	0.044330	-11.27468	254.7244
NMBL MicroBank	-0.001046	0.067651	0.097359	3.128010
Orix Investment Bank	-0.000137	0.040221	-0.435271	53.56506*
PICIC	0.000760	0.049903	-0.489868	264.7535*
Prime Comm. Bank	0.000448	0.043385	-0.373579	11.94873*
Saudi Pak Comm. Bank	0.000385	0.031000	0.242716	4.141417*
Soneri Bank	0.000161	0.029768	-2.058588	28.27258*
Union Bank	0.000819	0.040581	-0.628584	32.86580*

* The returns are significantly different from those of the normal distribution at 1%.

There are six banking stocks whose returns are positively skewed[*]. The positive skewness implies that the return-series of the shares traded on KSE have a heavier tail of large values and hence a higher probability of earning mean returns greater than their median values. Furthermore, values of all the kurtosis for positively skewed returns exceed the ideal value of 3, indicating significantly different from a normal distribution except NMBL. The NMBL is microfinance bank whose value of kurtosis marginally exceeds 3. Findings reveal non-normality prevailing due to leptokurtosis irrespective of the return series being either negatively skewed or positively skewed. Negative skewness for 16 out of 22 return series reveal probability of suffering losses for the investors in the banking stocks. Such leptokurtosis series are explained by serial correlation in the returns on account of variance process. Shocks of either sign are more likely to be observed at least unconditionally.

ARCH and GARCH (Parametric) Tests for Volatility

The excess kurtosis discussed in the previous section, suggests application of ARCH and GARCH family of modeling strategy to analyze returns from the banking stocks. The GARCH models of different order encompasses correction of autocorrelation and are robust to underlying non-normality. Results of these GARCH models are presented in the Table 2. The sum of the estimated parameters is approaching one for most of the banking stocks reveals extent of volatility. This implies persistence in the forecast of the conditional variance over all future horizons. The results also reveal an infinite variance for the unconditional distribution. Nonetheless, sum of the values of GARCH coefficients is around 0.7 for the banks such as Muslim Commercial Bank (MCB), National Bank (NBP), Soneri Bank, Meezan and FDIBL.

Median (Distribution) Equality Tests

Mean equality distribution has been ignored on account of non-normal distribution of the returns series of the banking stocks. Rather various rank-based nonparametric tests have been applied to test the hypothesis that the subgroups have the identical distribution,

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[*]Asset Investment Bank, CCBL-Bank, Islamic Bank, KASB BANK , NMBL MicroBank and Saudi Pak Comm. Bank

Table 2

Estimated GARCH (p,q) Models on Returns Data

Financial Institutions	(p,q)	Σ(γⱼ+ δᵢ)	Returns Data	(p,q)	Σ(γⱼ+ δᵢ)
Asset Investment Bank	(1,1)	0.995<1	Metro Bank	(1,1)	0.92<1
				(2,1)	---
	(2,1)	0.992<1			
Bank of Punjab	(1,1)	0.872<1	Muslim Commercial Bank	(1,1)	0.749<1
	(2,1)	n.a		(2,1)	0.737<1
Bank Al-Habib	(1,1)	0.839<1	National Bank	(1,1)	0.7266<1
				(2,1)	0.81<1
	(2,1)	0.983<1			
CCBL-Bank	(1,1)	0.935<1	NMBL MicroBank	(1,1)	0.821<1
				(2,1)	---
	(2,1)	0.92<1			
ESBL	(1,1)	0.866<1	Orix Investment Bank	(1,1)	1.007>1
				(2,1)	1.009>1
	(2,1				
Faysal Bank	(1,1)	0.83<1	PICIC	(1,1)	1.02>1
				(2,1)	1.03>1
	(2,1)	0.824<1			
FDIBL	(1,1)	0.584<1	Prime Commercial Bank	(1,1)	0.95<1
				(2,1)	0.946<1
	(2,1)				
Islamic Bank	(1,1)	1.224>1	Saudi Pak Comm. Bank	(1,1)	0.921<1
	(2,1)	1.175>1		(2,1)	0.92<1
JS Bank	(1,1)	0.99<1	Soneri Bank	(1,1)	0.772<1
	(2,1)	0.996<1		(2,1)	0.6153<1
KASB BANK	(1,1)	0.8548<1	Union Bank	(1,1)	0.932<1
	(2,1)	0.8904<1		(2,1)	0.914<1
Meezan Bank	(1,1)	0.353<1			
	(2,1)	0.7932<1			

Source: *Siddiqui (2008).*

against the alternative that at least one subgroup has a different distribution from the others. The stock-returns series have been grouped into five categories based on five days of the week. In statistical convention, the null hypothesis is that the two subgroups

are independent samples from the same general distribution against the alternative hypothesis that the values of the subgroups differ.

Wilcoxon Signed Ranks Test

Table 3
Results of Wilcoxon/Mann-Whitney Test for Returns Series

Returns Series	Monday	Tuesday	Wednesday	Thursday	Friday
Asset Investment Bank	0.405048	1.874198**	0.254223	2.139022*	0.738950
Bank of Punjab	0.715452	1.643539	1.870170**	0.569387	0.264066
Bank Al-Habib	2.636744*	2.361266*	1.049485	0.378595	1.507331
CCBL-Bank	1.669099**	1.071649	0.152914	0.590208	0.170176
ESBL	2.267340*	0.290578	0.496902	0.662330	1.416719
Faysal Bank	0.246456	0.813653	2.061781	0.199161	0.651982
FDIBL	2.203779*	1.456490	0.009008	2.553241*	1.127768
Islamic Bank	0.199711	0.711186	0.631260	0.608524	0.691499
JS Bank	0.577779	1.473542	1.617033	0.019477	0.508455
KASB BANK	0.397093	0.428322	0.761540	0.078115	0.021249
Meezan Bank	0.701535	0.363722	0.232081	1.293889	1.866361**
Metro Bank	1.688327**	0.984628	1.209792	1.859596**	1.222866
Muslim Commercial Bank	0.419952	0.756171	2.071952*	0.086112	1.000437
National Bank	2.231875*	1.535369	0.589549	0.239498	0.125907
NMBL MicroBank	0.452598	1.642677**	1.658889**	0.233656	0.613213
Orix Investment Bank	1.258974	0.328254	2.384844*	0.262386	0.479706
PICIC	0.131021	1.186142	3.117193*	0.304548	2.041585*
Prime Comm. Bank	0.783137	1.019973	0.807345	1.835564**	2.051346*
Saudi Pak Comm. Bank	0.744746	0.907468	0.739239	0.045892	0.955268
Soneri Bank	0.758192	0.049801	0.791119	1.928463**	0.361699
Union Bank	0.114852	1.506425	1.458149	1.122175	1.572125

* Significant at p-value of less than 5 %.
** Significant at p-value of less than 10 %.

The study employs Wilcoxon test in order to examine and compare the median ranks across five subgroups. In this test the absolute value of the difference between each observation and the median is computed, and then these observations are ranked from high to low. The Wilcoxon test is based on the idea that the sum of the ranks for the samples above and below the median is similar. Wilcoxon test requires that the differences are a sample from a symmetric distribution. This assumption is less stringent than the requirement of normal distribution. Rejection of the null hypothesis with favorable p-value means asymmetric day-of-the-week effects. For all the financial institutions, results are reported in the Table 3 across the five days.

The analysis goes across the rows and also across the columns. For a given banking stock across the row, returns have been compared for different days of the week. Similarly, for any given

day of the week returns have been compared for all the banking stocks, under consideration, across the column.

Results reveal evidence of day-of-the-week effect for various stocks. Only Bank Al-Habib, ESBL, FDIBL and National Bank have a significantly high median return on Monday. On Tuesday, only investment in the stocks of Bank Al-Habib accrues significantly high returns as compared to the other banking stocks in this empirical analysis. The stocks of Muslim Commercial Bank, Orix Investment Bank and PICIC accrue better returns than other stocks on Wednesday. Asset Investment Bank and FDIBL reveal better results on Thursdays. Median returns from the PICIC and Prime Commercial Bank are significantly outperforming other stocks on Fridays. For rest of the banking stocks, day-of-the-week effect does not seem much relevant for the investors in the stock market according to the Wilcoxon test results.

Kruskal-Wallis Test

The pattern of Kruskal-Wallis Test is similar to the Mann-Whitney test where the former is generalized form of the latter. Again the idea behind the test is to rank the series from smallest value in terms of rank 1 to the largest one. Then it compares sum of the ranks from a subgroup to the sum of the ranks from another subgroup. It is computed exactly the same way as Wilcoxon/Mann-Whitney test except that it covers more groups with relatively less stringent assumptions. Hence its results might be better than the earlier tests. The null hypothesis is that the groups have the same median return and rejecting this hypothesis with appropriate p-value means asymmetric day-of-the-week effects. For all the financial institutions, results of Kruskal-Wallis (Breslow, 1970) test have been reported in Table 4 for all the five days. The readers are referred to Theodorsson-

Kruskal-Wallis Test reiterates the findings of the Wilcoxon Test for Monday, Tuesday and Friday. As for Wednesday and Thursday, the Faysal Bank and Soneri Bank respectively are added to the list of outperforming stocks.

Norheim (1986) for more details on the application of Kruskal-Wallis Tests.

Table 4
Results of Kruskal-Wallis Test

Returns Series	Monday	Tuesday	Wednesday	Thursday	Friday
Asset Investment Bank	0.164111	3.512836**	0.064659	4.575661*	0.546135
Bank of Punjab	0.511913	2.701318**	3.497646**	0.324235	0.069747
Bank Al-Habib	6.952597*	5.575736*	1.101489	0.143360	2.272153
CCBL-Bank	2.786654**	1.148924	0.023452	0.348615	0.029038
ESBL	5.142092*	0.084597	0.247188	0.439045	2.007896
Faysal Bank	0.060755	0.662080	4.251064*	0.039677	0.425120
FDIBL	4.858011*	2.122265	8.68E-05	6.520616*	1.272588
Islamic Bank	0.039914	0.505890	0.398581	0.370388	0.478271
Jahangeer Siddiqui Bank	0.333927	2.171574	2.615069	0.000383	0.258614
KASB BANK	0.157769	0.183553	0.580108	0.006119	0.000456
Meezan Bank	0.492282	0.132362	0.053905	1.674391	3.483654**
Metro Bank	2.850655**	0.969611	1.463741	3.458320**	1.495550
Muslim Commercial Bank	0.176384	0.571838	4.293107*	0.007420	1.000934
National Bank	4.981615*	2.357599	0.347660	0.057397	0.015872
NMBL MicroBank	0.205500	2.700777**	2.754202**	0.054932	0.376963
Orix Investment Bank	1.585105	0.107774	5.687650*	0.068865	0.230153
PICIC	0.017185	1.407102	9.717336*	0.092793	4.168362*
Prime Comm. Bank	0.613366	1.040423	0.651868	3.369439**	4.208182*
Saudi Pak Comm. Bank	0.554823	0.823715	0.546649	0.002117	0.912764
Soneri Bank	0.574908	0.002484	0.625923	3.719101*	0.130852
Union Bank	0.013200	2.269431	2.126309	1.259361	2.471702

* Significant at p-value of less than 5 %.
** Significant at p-value of less than 10 %.

Variance Equality Tests

It is important to identify differential in risk associated with returns from different days of the week. For this purpose the variance equality tests have been applied under the null hypothesis that the risk associated with returns of all the banking stocks is the same across all the subgroups or working days of the week, against the alternative that at least one subgroup has a different variance (Conover, Johnson, & Johnson, 1981). This study, among the variance equality tests, employs the Levene test and Brown-Forsythe test. Results of the latter have been presented in the Table 5.

Levene Test and Brown-Forsythe Test

Levene test (Nordstokke & Zumbo, 2010) is run on the pattern of an analysis of variance (ANOVA) of the absolute difference from the mean. The F-statistic for the Levene test depends upon the ratio of variances of the two subgroups with their respective degrees of freedom. As the distribution of returns series for the banking stocks is not normal, preferably the values of Brown-Forsythe test (Roth, 1983) was applied which is modified form of Levene test. In this test we replace the absolute mean difference with the absolute median

difference. That is why Brown-Forsythe test is relatively better in terms of robustness and power.

Table 5
Brown-Forsythe Test

Returns Series	Monday	Tuesday	Wednesday	Thursday	Friday
Asset Investment Bank	0.004492	0.031605	0.024186	0.618817	0.539400
Bank of Punjab	3.376885**	0.276763	0.003966	0.012229	4.558577*
Bank Al-Habib	1.974895	0.003649	0.606983	1.386167	0.627791
CCBL-Bank	2.208478	1.475751	0.187739	0.078509	1.105466
ESBL	1.411207	0.047113	3.544886**	4.176946*	2.133827
Faysal Bank	18.20687*	0.995061	0.001246	3.252465**	4.645237*
FDIBL	0.602105	2.471597	0.413315	0.062188	0.652954
Islamic Bank	1.650269	0.194541	0.839336	0.003316	0.907293
JS Bank	5.117308*	0.166496	0.675256	0.728146	0.214591
KASB BANK	0.829883	0.088547	2.174376	0.015870	1.015117
Meezan Bank	6.455679*	2.963357**	0.018454	1.003889	0.078678
Metro Bank	0.539745	0.166671	0.852745	1.930346	0.102747
Muslim Commercial Bank	1.761422	0.773084	0.216487	0.030135	8.283742*
National Bank	5.537464*	1.066891	0.035400	1.888972	5.723355*
NMBL MicroBank	3.083851**	0.882135	1.978855	0.408457	0.357655
Orix Investment Bank	0.832371	2.157795	1.472929	1.934981	0.080420
PICIC	0.273219	1.116062	1.065792	0.701952	0.254986
Prime Comm. Bank	6.009263*	2.879487**	7.44E-05	1.525949	0.588721
Saudi Pak Comm. Bank	1.696445	0.036720	0.021259	0.136933	0.881899
Soneri Bank	0.000915	0.238533	0.695208	0.002534	1.628550
Union Bank	2.674565**	1.043124	0.096103	0.030687	1.732985

The test results from the historical returns series of the 22 banking stocks reveal relatively greater risk associated with the returns of Faysal Bank, Jahangeer Siddiqui Bank, Meezan Bank, National Bank and Prime Commercial Bank on Mondays- the opening working day of the week. Only for the National Bank's stocks, direct relation between the risk and median returns is observed on Monday. For the days in the middle of the week the risks associated with all the banking stocks are not asymmetric except the stock of ESBL for which the risk is quite significant on Thursdays. For the closing day of the week variance in respect of Bank of Punjab, MCB, Faysal Bank, and National Bank is significantly large.

As the distribution of data were found to be non-normal, thus nonparametric tests such as Wilcoxon (Gehan, 1965),/Mann-Whitney test (Hart, 2001), Kruskal-Wallis test, Levene test and Brown-Forsythe test are employed to investigate the evidence of day-of-the-week effects in terms of returns and risk both. Results of the normality tests indicate that much of the non-normality is due to leptokurtosis irrespective of the return series being negatively skewed or positively skewed. Negative skewness, for 16 out of 22 series, reveals probability

of suffering losses for the investors in the banking stocks. The leptokurtosis shapes of the returns series may be explained by serial correlation in the returns variance process which shows that big surprises or shocks of either sign are more likely to be observed unconditionally.

Conclusion

This study has investigated day-to-day behavior of the 22 banking stocks in the Karachi Stock Exchange. In terms of empirical regularities it explores day-of-the-week effect for the individual stocks rather than accounting for the over all index of the stock market. In this context the present study may be considered as the first attempt in Pakistan which employs nonparametric tools of analysis for the day of the week anomalies.

The GARCH models have revealed volatility and uncertainty of returns of the banking stocks. Results of these models reveal the evidence of persistence in the forecast of the conditional variance over all future horizons, and imply an infinite variance for the unconditional distribution. High degree of uncertainty is associated with the returns on the banking stocks in the KSE. Institutional involvement in the transactions of secondary market can be one of the reasons for excessively rising index of the KSE in general and banking stocks in particular. Institutions are influential in the stock markets. They can withdraw their huge amount of capital creating an uncertain situation for the small investors. Security and Exchange Commission of Pakistan (SECP) should take serious notice of expeditious involvement in the activities of stock markets in order to discipline the market activities.

Nonparametric tests substantiate the evidence of weekend-effect for some of the stocks. The results may possibly depend on sample size or the period of study. Hence conclusive results demonstrating no day-of-the-week effects for most of the banking stocks could be drawn here for which more comprehensive studies with additional information can be conducted. The study finds relatively high risk associated with the stocks of some of the leading financial institutions such as Bank of Punjab, Faysal Bank, Muslim Commercial Bank and National Bank on the closing day of the week.

Volatility test reveals Muslim Commercial Bank, National Bank, Soneri Bank, Meezan and FDIBL the most efficient stocks among the 22 banking stocks. Results of the nonparametric test reveal that Bank Al-Habib, ESBL, FDIBL and National Bank have a significantly high median return on Monday, Bank Al-Habib accrues significantly high returns on Tuesday, Muslim Commercial Bank, Orix Investment Bank, PICIC, Faysal Bank and Soneri Bank accrue better returns on Wednesday, Asset Investment Bank and FDIBL reveal better results on Thursday and median returns from the PICIC and Prime Commercial Bank are significantly outperforming other stocks on Fridays. The study finds out relatively greater risk associated with Faysal Bank, Jahangeer Siddiqui Bank, Meezan Bank, National Bank and Prime Commercial Bank on Mondays. For the days in the middle of the week the risks associated with the banking stocks are not asymmetric. Risk in respect of Bank of Punjab, Faysal Bank, Muslim Commercial Bank and National Bank is significantly large for Friday, the closing day of the week.

These findings show departure, in a way, from the market efficiency hypothesis. Hopefully this study provides some insight and understanding of the KSE in general and the attitude of banking stocks in particular in terms of the day-of-the-week regularity. Future studies can extend to document day-of-the-week regularity by incorporating circuit-breaking system introduced in the KSE by SECP in the light of findings of this study when reasonably large data is available. There is need to analyze the effect of new regulatory measures taken by the SECP.

References

Aggarwal, R., & Rivoli, P. (1989). Seasonal and day of the week effects in four emerging stock markets. *Financial review, 24*(4), 541-550.

Bessembinder, H., & Hertzel, M. G. (1993). Return autocorrelations around nontrading days. *Review of Financial Studies, 6*(1), 155-189.

Breslow, N. (1970). A generalized Kruskal-Wallis test for comparing K samples subject to unequal patterns of censorship. *Biometrika, 57*(3), 579-594.

Cheung, K. C., & ANDREW COUTTS, J. (1999). The January effect and monthly seasonality in the Hang Seng index: 1985-97. *Applied Economics Letters, 6*(2), 121-123.

Condoyanni, L., O'HANLON, J., & Ward, C. W. (1987). Day of the week effects on stock returns: international evidence. *Journal of Business Finance & Accounting, 14*(2), 159-174.

Connolly, R. A. (1989). An examination of the robustness of the weekend effect. *Journal of Financial and quantitative Analysis, 24*(02), 133-169.

Connolly, R. A. (1991). A posterior odds analysis of the weekend effect. *Journal of Econometrics, 49*(1), 51-104.

Conover, W. J., Johnson, M. E., & Johnson, M. M. (1981). A comparative study of tests for homogeneity of variances, with applications to the outer continental shelf bidding data. *Technometrics, 23*(4), 351-361.

Dubois, M., & Louvet, P. (1996). The day-of-the-week effect: The international evidence. *Journal of Banking & Finance, 20*(9), 1463-1484.

Fields, M. J. (1931). Stock prices: a problem in verification. *The Journal of Business of the University of Chicago, 4*(4), 415-418.

French, K. R. (1980). Stock returns and the weekend effect. *Journal of Financial Economics, 8*(1), 55-69.

Gehan, E. A. (1965). A generalized Wilcoxon test for comparing arbitrarily singly-censored samples. *Biometrika, 52*(1-2), 203-223.

Gibbons, M. R., & Hess, P. (1981). Day of the week effects and asset returns. *Journal of business*, 579-596.

Hart, A. (2001). Mann-Whitney test is not just a test of medians: differences in spread can be important. *British Medical Journal, 323*(7309), 391.

Ho, Y. K. (1990). Stock return seasonalities in Asia Pacific markets. *Journal of International Financial Management & Accounting, 2*(1), 47-77.

Jaffe, J., & Westerfield, R. (1985). The week end effect in common stock returns: The international evidence. *The journal of finance, 40*(2), 433-454.

Keim, D. B., & Stambaugh, R. F. (1984). A further investigation of the weekend effect in stock returns. *The journal of finance, 39*(3), 819-835.

Koh, S.-K., & Wong, K. A. (2000). *Anomalies in Asian emerging stock markets*: Cambridge, UK: Cambridge University Press.

Lakonishok, J., & Smidt, S. (1988). Are seasonal anomalies real? A ninety-year perspective. *Review of Financial Studies, 1*(4), 403-425.

Linn, S. C., & Lockwood, L. J. (1988). Short-term stock price patterns: NYSE, AMEX, OTC. *The Journal of Portfolio Management, 14*(2), 30-34.

McKenzie, M. D., Brooks, R. D., Brailsford, T., & Faff, R. (1999). *Research design issues in time-series modelling of financial market volatility*: McGraw-Hill.

Nordstokke, D. W., & Zumbo, B. D. (2010). A new nonparametric Levene test for equal variances. *Psicológica: Revista de metodología y psicología experimental, 31*(2), 401-430.

Roth, A. J. (1983). Robust trend tests derived and simulated: Analogs of the Welch and Brown-Forsythe tests. *Journal of the American Statistical Association, 78*(384), 972-980.

Siddiqui, M. A. (2008). Banking Sector Reforms in Pakistan and Banking Stock Volatility In KSE. *International Journal of Economic Perspectives, 2*(4), 200.

Siegel, J. J. (1998). Stocks for the Long Run by Jeremy Siegel. *NewYork, USA*.

Theobald, M., & Price, V. (1984). Seasonality estimation in thin markets. *The journal of finance, 39*(2), 377-392.

Theodorsson-Norheim, E. (1986). Kruskal-Wallis test: BASIC computer program to perform nonparametric one-way analysis of variance and multiple comparisons on ranks of several independent samples. *Computer methods and programs in biomedicine, 23*(1), 57-62.

Tong, W. (2000). International evidence on weekend anomalies. *Journal of financial research, 23*(4), 495-522.