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The Bombay stock exchange: seasonalities and investment opportunities

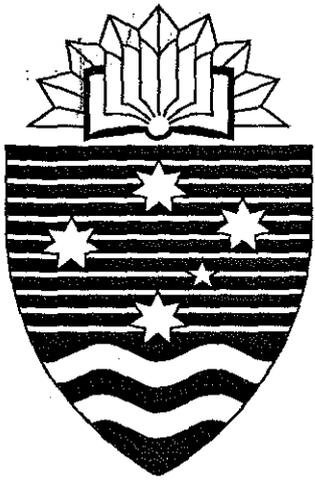
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**"The Bombay Stock Exchange:
Seasonalities and Investment Opportunities"**

by

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THE BOMBAY STOCK EXCHANGE: SEASONALITIES AND

INVESTMENT OPPORTUNITIES

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THE BOMBAY STOCK EXCHANGE: SEASONALITIES AND
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ABSTRACT

This paper examines the relationship of stock return patterns on the Bombay Stock Exchange (BSE) with those of the New York Stock Exchange (NYSE). It also examines investment opportunities for international investors. The data include daily closing values of the BSE and S&P 500 Indexes for the period 1979-1990. Parametric and nonparametric tests are utilized.

The BSE exhibits seasonalities in stock return patterns. December provides the highest mean monthly return while week 4 has the highest mean weekly return. A weak form of the weekend effect is observed. The relationship of return patterns on the BSE and the NYSE indicates similarity of return patterns for contemporaneous trading. However, the BSE and the NYSE appear to be segmented rather than integrated. This may be explained by the isolation of the BSE, the institutional restrictions on direct trading on the BSE by foreign nationals and foreign exchange controls. A segmented market offers better investment opportunities because of low correlation of returns.

I. INTRODUCTION

The Bombay Stock Exchange (BSE) belongs to the group known as the emerging markets. The BSE is one of 15 stock exchanges in India. It was established in 1875 and, according to the Bombay Stock Exchange Report of 1988-1989, accounted for over 80 percent of the total value of trading in the Indian market in 1988. There were 4,767 stocks representing 2,275 companies in 1989.

Although foreign investors are not permitted to trade in Indian capital markets, they can participate indirectly. The India Fund listed on the London Stock Exchange and the India Growth Fund listed on the New York Stock Exchange provide opportunities for foreign investors to participate in Indian capital markets. Therefore, the return patterns of BSE stocks are of interest to foreign investors. Low correlation between returns in emerging and developed markets can enable such investors to reduce systematic risk. A key motivation for this study is the investigation of opportunities for reducing systematic risk through the inclusion of BSE stocks in the portfolio of international investors. The study examines seasonalities using parametric and nonparametric tests. The correlation of return patterns on the BSE and NYSE are also analyzed.

II. LITERATURE REVIEW

Stock Market Anomalies

In recent years, efficient market theory has been challenged with the detection of systematic patterns in stock price changes.

Rozeff and Kinney (1976) observed statistically significant differences in mean returns among months due mainly to large January returns. The mean monthly return in January, over the sample period, was 3.48 percent whereas the mean monthly return from February to December was 0.68 percent.

Banz (1981) examined the relationship between the stock return and market value of common stocks and found that smaller firms had higher average risk-adjusted returns than larger firms. Brown, Kleidon and Marsh (1983) found a relation between excess returns and firm size which was linear in the logarithm of size. However, these ex ante excess returns attributable to size were not constant through time. Keim (1983) noted that daily abnormal return distributions in January have large means relative to the remaining 11 months. Berges, McConnell and Schlarbaum (1984) examined monthly stock returns in Canada and noted that January returns in Canada exceeded returns for other months of the year before and after the introduction of a capital gains tax in 1973. The tax-loss-selling hypothesis has been offered as an explanation for the turn of the year

effect. The small-firm effect has been suggested as another explanation for this phenomenon.

Ariel (1987) indicates that the monthly pattern of stock index returns exhibits positive average risk-adjusted returns only around the beginning and during the first half of calendar months. Average returns during the second half of calendar months were zero. The magnitude of the monthly effect in stock returns was found to be of the same order as that of the weekend effect.

Penman (1987) analyzed the distribution of earning news over time and seasonalities in aggregate stock returns. Returns on stock market indexes were on average higher during the first half-month of calendar quarters two through four than at other times. Further, corporate earnings news released during these half-month periods tended to be good.

French (1980) noted that the average return for Monday was significantly negative while the average return for the other four days of the week was positive. Jaffe and Westerfield (1985) examined the daily stock market returns for the U.S., Japan, Canada, U.K. and Australia. They observed a weekend effect in each country. Japan and Australia showed the lowest mean returns on Tuesday. A significant independent seasonal in the return distributions of each country was observed. This pattern was independent of the weekend effect in the U.S. Neither measurement error nor settlement procedures

was considered responsible for the weekly seasonal in stock market returns. Moreover, the seasonals found in foreign exchanges did not offset the seasonal in the foreign markets.

Sharma (1983) examined the efficiency of the Bombay stock market and the randomness of stock price behavior on the BSE. Data for 23 stocks listed on the BSE in the period 1973-1978 were used. The results indicated that price changes of stocks listed on the BSE possessed similar characteristics to those of other leading stock markets. The author concluded that stock price changes followed a general random-walk behavior.

Sharma and Kennedy (1977) tested the random-walk behavior of the BSE and compared it to that of the U.S. and U.K. The data covered the period 1963-73 and consisted of monthly observations on the BSE Index, the S&P 425 Index and the London Financial Times Actuaries 500 Stock Index. Runs analysis revealed that the expected number of runs and observed number of runs were very close to each other for the stock indexes of London, New York and Bombay. Analysis of spectral densities of each index verified the randomness of the series. The study concluded that stock prices on the BSE followed a random walk and reacted similarly to markets in the U.S. and U.K.

Unlike the study by Sharma and Kennedy which used monthly data for the period 1963-1973, the current study uses daily data of the BSE and S&P 500 Indexes for the

period 1979-1990. There are 2255 observations in the current study in comparison to 132 observations in the Sharma and Kennedy study. This permits more powerful statistical tests. The relevance of the current study is heightened by the fact that the Indian economy and the BSE have grown considerably since the 1970s.

III. DATA AND METHODOLOGY

The data for this study consist of daily closing values of the Bombay Stock Exchange (BSE) Index and the Standard and Poor's (S&P) 500 Index for the period 1979-1990. Data on the BSE Index were provided by the Bombay Stock Exchange.

The empirical tests of stock index behavior on the BSE examine the systematic pattern of stock returns.

These tests were conducted using changes in the stock index expressed in terms of the natural logarithm. Changes in the stock index are defined as:

$$U_{t+1} = \ln(\text{Index}_{t+1}) - \ln(\text{Index}_t)$$

The first differences of natural logarithms provide the continuously compounded yield.

Turn of the Year Effect

The hypothesis for the test of the monthly return pattern is:

H_1 : The mean returns for each month are equal.

$$\text{Model: } R_{it} = \sum \alpha_{1j} D_j + E_{1j}$$

where R_{it} = the changes of $\ln(\text{Index})$ for the BSE Index

during time t .

D_j is the dummy variable with $j = 1, 2, \dots, 12$.

Turn of the Month Effect

An F test was used to examine if weekly returns within a month exhibit any particular patterns. The hypothesis of the test is:

H_2 : There is no difference among the weekly returns within each month.

$$\text{Model: } R_{it} = W_{1i}D_{1t} + W_{2i}D_{2t} + W_{3i}D_{3t} + W_{4i}D_{4t} + E_{it}$$

where R_{it} = the returns of the BSE Index in period t

$D_{1t} = 1$ if the returns are in week 1

0 otherwise

W_{1i} = the mean returns on week 1

E_{it} = the residual

Turn of the Week Effect

An F test was used to examine if there was any specific pattern of daily returns within a week. The hypothesis of the test is:

H_3 : There is no difference among the daily returns within each week.

$$\text{Model: } R_{it} = \mu_{1i}D_{1t} + \mu_{2i}D_{2t} + \mu_{3i}D_{3t} + \mu_{4i}D_{4t} + \mu_{5i}D_{5t} \\ + E_{it}$$

where $D_{1t} = 1$ if the returns are on Monday in period t

0 otherwise

μ_{1i} = the mean returns on Monday for the BSE Index

In summary, seasonalities on the BSE were examined using regression models that test for turn of the year, turn of the month and turn of the week effects.

IV. EMPIRICAL RESULTS

The results of the tests covering the period 1979-1990 are provided in this section. Parametric and nonparametric tests will be used in this study to validate results. The Kruskal-Wallis test is nonparametric and tests the null hypothesis that the mean returns are equal against the alternative that they are not.

Turn of the Year Effect

Table 4-1 shows the results of the regression for the turn of the year effect over the period 1979-1990 for the BSE Index. The F value is 1.988 and the value for the Kruskal-Wallis test is 20.18. The Kruskal-Wallis procedure is a nonparametric test. It is used to test the hypothesis that the 12 months have identical means.

The mean return in April and June of 3.73 and 3.46 percent respectively are significant at the .05 level. December shows the highest mean return of 4.55 percent which is significant at the .01 level. April is the beginning of the taxation year in India and higher mean returns in April may be explained by the tax-loss-selling hypothesis. This hypothesis maintains that investors are induced to sell stocks with negative returns to recover

capital losses at the end of the tax year. The proceeds of these sales are presumably reinvested at the beginning of the new tax year. The aggregate effect is higher mean returns in April.

With respect to the high returns in June, it should be noted that most Indian companies pay bonuses twice a year to their employees, most frequently in June and December. It is suggested that some of the funds find their way into the stock market. Kato and Schallheim (1985) draw a similar inference in their study of seasonalities in the Tokyo stock market. However, this explanation for the June and December effects is purely conjectural.

The mean daily return in December is 0.3 percent which is the highest for any month. December has consistently exhibited higher returns while containing the fewest trading days in the sample period. Appendix A.3 shows that the average number of trading days in December is 15 while February has the highest average of 18 days in the sample period. The BSE is closed for a week at the end of December each year. This is a practice that is unique to the BSE. Firms generally release positive information in December before the market closes for a week at the end of the year. It is suggested that this practice contributes to higher returns for investors. Penman (1987), Baruch and Penman (1990) and Chambers and Penman (1984) have studied the reporting practices of firms with respect to earnings

and stock price reaction. They suggest that firms generally announce positive earnings information promptly while delaying the release of negative news. Another explanation is that brokers' recommendations are released towards the end of the year. Brokers typically issue more buy recommendations which contribute to buying pressure and therefore higher prices.

"Window dressing" by mutual fund managers is offered as another explanation of the December effect on the BSE. Mutual funds rebalance their portfolios prior to year end to remove securities which might be embarrassing if they appeared on year-end balance sheets. Mutual fund managers normally reduce cash positions before the reporting period. Mutual funds are major players in Indian stock markets and influence market direction. They invest in larger and more active companies which corresponds to the composition of the BSE Index.

Turn of the Month Effect

Table 4-2 shows the regression results for the turn of the month effect over the period 1979-1990 for the BSE Index. The F statistic is 2.864 and the Kruskal-Wallis test statistic is 2.56. The hypothesis of equality of weekly returns is rejected. The return in week 4 is the highest at 0.67 percent and is significant at the .05 level. The turn of the month effect on the NYSE shows high returns in weeks 1 and 2 and lower returns in weeks 3 and 4 according to Ariel (1987). The evidence of

highest returns at the last week in the month parallels the pattern of highest returns in the last month of the year. Appendix A.4 shows the average number of trading days by week for the sample period, 1979-1990. Week 4 has the highest number of trading days, on average, of 4.47 days. The mean daily return in week 4 is also the highest at 0.15 percent. A combination of higher mean daily returns and fewer holidays in week 4 contribute to its having the highest mean return.

Turn of the Week Effect

Table 4-3 presents the regression results for the turn of the week effect. The F statistic is 3.398 and the Kruskal-Wallis test statistic is 9.77. The null hypothesis of equality of weekday returns is rejected. The mean return on Friday is the highest, 0.18 percent, and is significant at the .01 level. The mean return on Tuesday, 0.13 percent, is significant at the .05 level and has the second highest return. The reason for the high return on Tuesday is not clear. The mean return on Monday is not significant. The weekend effect may be present on the BSE, albeit in a weak form, as it is on the NYSE.

French (1980) has noted a weekend effect in U.S. security returns. Investors adopt security positions on Fridays prior to the weekend. The passage of two consecutive non-trading days accompanied by information flows leads to the readjustment of portfolios on Mondays.

The net effect of this weekend phenomenon is a consistent record of positive returns on Fridays and negative returns on Mondays. A similar phenomenon is observed on the BSE.

International Diversification

The motivation for investor interest in emerging capital markets can be explained by a discussion of risk and diversification. Foreign investors can now participate in Indian equity markets through the India Growth Fund. International diversification has evolved into an acceptable option in portfolio management. The current policy of the Indian government does not permit direct investment by foreign nationals in Indian stock markets. However, recent developments suggest that this current policy might soon be reversed. In 1991, the stock market in Seoul, South Korea rescinded its ban on foreign participation in the Seoul stock market. The BSE is the last major stock market in Asia with a ban on participation by foreign nationals. The Securities and Exchange Board of India, established in 1988, has a mandate to make recommendations to the government on changes that will propel the BSE and other stock markets in India to parity with other major markets in Asia. Recent proposals from the Securities and Exchange Board with respect to improving market liquidity and coordinating activities on the BSE and other stock markets in India point to more open markets.

Policymakers in government have been discussing the feasibility of the privatization of firms in the public sector. Restrictions on Indian nationals living abroad have been eased considerably to allow participation in Indian stock markets.

Correlation coefficients for emerging markets and the U.S. market are typically quite low in spite of growing worldwide interdependence. Eun and Shim (1989) observe that the contemporaneous correlations of the U.S. with Asian and European markets are low. While the trading hours of these markets precede those of the U.S., occurrences in these markets do not significantly affect the U.S. market. The geographic and economic separation between the U.S. and India contribute to a correlation coefficient of the BSE and the S&P Indexes of 0.01 for the five-year period ending December 1988 as shown in Appendix A.3.

The NYSE and the BSE exhibit some similarities. The dominance of institutions is a case in point. The similarity of weekday return patterns is another example. Both markets are weak-form efficient though there is a difference in the degree of efficiency. In the presence of transaction costs, investors cannot profit from trading strategies. With respect to differences between the two markets, the government is the dominant player in the Indian economic scene whereas the private sector is the sovereign power in the U.S. Key industries such as banking, transportation and finance are owned by the

public sector in India whereas they are privately held in the U.S. The systematic factors are significantly independent and the markets appear to be segmented. India has adopted policies to protect domestic industries and has instituted stringent controls on imports and foreign investment. The net effect has been a high degree of autonomy of the BSE. The BSE is affected far less by external events and is impacted to a greater degree by domestic factors such as the monsoons and the harvest outlook.

V. SUMMARY AND CONCLUSIONS

This study examines the returns of the BSE and the S&P 500 Indexes for the period April 1979 to July 1990. Parametric and nonparametric tests were used to confirm the findings of this study.

The analysis of seasonalities on the BSE reveals several differences from stock return patterns on the NYSE. With respect to the BSE Index, the turn of the year effect indicates positive returns in April, June and December with December exhibiting the highest mean return. Cash positions are highest in December, presumably, because of bonus payments by employers and rebalancing of portfolios by institutions. Positive returns in April are similar to the pattern in the U.K.

The turn of the month effect on the BSE reveals that week 4 has the highest return. The evidence of highest

returns at the last week in the month mirrors the pattern of highest returns in the last month of the year.

The turn of the week effect on the BSE indicates highest returns on Friday with Tuesday having the second highest return. The return on Monday is the lowest. The release of negative information by firms after the market close on Fridays may cause the weekend effect. Most stock markets exhibit the weekend effect. An examination of return relationships on the BSE and NYSE indicates that the weekday seasonal in the U.S. is similar to the contemporaneous seasonal in Bombay. The U.S. seasonal led by one day is different from the Bombay seasonal. The NYSE and the BSE appear to be segmented rather than integrated. Foreign exchange controls prevent Indian residents from investing on the NYSE. Non-Indians are not permitted to invest directly on the BSE. Indian stocks are not listed in foreign stock exchanges and only subsidiaries of foreign firms are listed on the BSE. Major blocks of shares of large Indian firms are held by government-controlled agencies.

In summary, this study shows some interesting similarities of the BSE and the NYSE. It also exposes the dissimilarities. The weekend effect is observed in both markets, albeit in a limited sense on the BSE. The pattern of daily returns is similar in both markets. Institutions dominate trading on the NYSE and the BSE.

The BSE and the NYSE appear to be segmented. Foreign exchange controls and restrictions on foreign

investments in India have served to isolate the BSE from other markets. The markets do not appear to have any significant influence over each other. However, as noted earlier, the pattern of daily returns is similar in both markets. The anomalies observed on the BSE support the international evidence that stock market seasonalities are generally world-wide phenomena. Another item of interest is that the BSE has provided higher returns as shown in Appendix A.1. U.S. investors can tap into the BSE through the India Growth Fund. This provides an opportunity for increasing total return while reducing systematic risk. An area for future research is an examination of return patterns of the India Growth Fund and their relationship to those on the NYSE.

The empirical findings in this paper suggest that abnormal returns may be earned by buying stocks in November and selling them in the following December or buying stocks on Monday and selling them on the following Friday. The limitations of this study have not permitted research of the semistrong-form efficiency of the BSE. Daily price data on individual stocks and information on dividend, bonuses and stock splits will be required to conduct this research. The efficiency of the BSE with respect to publicly available information can be tested and analyzed. The impact on the BSE of recent relaxations on international investment and trade in India is another topic for future research.

TABLE 4-1

TEST FOR THE TURN OF THE YEAR EFFECT ON THE BSE

1979-1990

$$\text{Model: } R_{it} = \sum \alpha_{ij} D_j + E_{ij}$$

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	12	0.004933134	0.000411094	1.988	0.0218
ERROR	2243	0.46382472	0.000206788		
U TOTAL	2255	0.46875785			
ROOT MSE		0.01438011	R-SQUARE	0.0105	
DEP MEAN		0.0009517066	ADJ R-SQ	0.0052	
C.V.		1510.982			
KRUSKAL-WALLIS TEST		20.18	PROB > CHISQ	0.0429	

PARAMETER ESTIMATES

PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB > T	
JANUARY	0.000218227	0.001043243	0.209	0.8343
FEBRUARY	0.001228042	0.001045999	1.174	0.2405
MARCH	0.000359887	0.001024541	0.351	0.7254
APRIL	0.002263223	0.001035103	2.186	0.0289
MAY	0.000909117	0.001004351	0.905	0.3655
JUNE	0.001921943	0.000987630	1.946	0.0518
JULY	0.001783490	0.001029781	1.732	0.0834
AUGUST	-0.001222112	0.001083942	-1.127	0.2597
SEPTEMBER	0.001187686	0.001063009	1.117	0.2640
OCTOBER	0.000174086	0.001063009	0.164	0.8699
NOVEMBER	-0.000559062	0.001096473	-0.510	0.6102
DECEMBER	0.003033004	0.001136848	2.668	0.0077

TABLE 4-2

TEST FOR THE TURN OF THE MONTH EFFECT ON THE BSE

1979-1990

$$\text{Model: } R_{1t} = W_{11}D_{1t} + W_{21}D_{2t} + W_{31}D_{3t} + W_{41}D_{4t} + E_{1t}$$

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	4	0.002373801	0.000593450	2.864	0.0221
ERROR	2251	0.46638405	0.000207190		
U TOTAL	2255	0.46875785			
	ROOT MSE	0.01439409	R-SQUARE		0.0051
	DEP MEAN	0.0009517066	ADJ R-SQ		0.0033
	C.V.	1512.45			
	KRUSKAL-WALLIS TEST	2.56	PROB > CHISQ		0.4641

PARAMETER ESTIMATES

	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB>!T!
WEEK 1	0.001165644	0.000609897	1.911	0.0561
WEEK 2	0.000614736	0.000617709	0.995	0.3198
WEEK 3	0.000531509	0.000611546	0.869	0.3849
WEEK 4	0.001445220	0.000587147	2.461	0.0139

TABLE 4-3

TEST FOR THE TURN OF THE WEEK EFFECT ON THE BSE

1979-1990

$$\text{Model: } R_{it} = \mu_{1i}D_{1t} + \mu_{2i}D_{2t} + \mu_{3i}D_{3t} \\ + \mu_{4i}D_{4t} + \mu_{5i}D_{5t} + E_{it}$$

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	5	0.003512995	0.000702599	3.398	0.0048
ERROR	2250	0.46524486	0.000206775		
U TOTAL	2255	0.46875785			
	ROOT MSE	0.01437969		R-SQUARE	0.0075
	DEP MEAN	0.0009517066		ADJ R-SQ	0.0053
	C.V.	1510.937			
	KRUSKAL-WALLIS TEST	9.77		PROB > CHISQ	0.0446

PARAMETER ESTIMATES

	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > !T!
MONDAY	-0.000722999	0.000791576	-0.913	0.3611
TUESDAY	0.001337655	0.000661179	2.023	0.0432
WEDNESDAY	0.000592547	0.000647629	0.915	0.3603
THURSDAY	0.001205666	0.000652276	1.848	0.0647
FRIDAY	0.001847565	0.000661179	2.794	0.0052

A.1

COMPOUNDED ANNUAL RETURNS IN US\$
DECEMBER 1975-83

Chile	27.7 %
Korea	21.5
India	20.4
Jordan	19.9
Argentina	18.7
Japan	16.8
Brazil	16.7
Singapore	15.0
Thailand	14.6
USA	13.5
World	12.1
Hong Kong	9.2
Zimbabwe	0.8
Mexico	-1.4

Source: IFC Emerging Markets Data Base

A.2

AVERAGE NUMBER OF TRADING DAYS BY MONTH

1979-90

January	17.5
February	18.0
March	18.0
April	16.5
May	17.4
June	18.0
July	16.7
August	16.0
September	17.0
October	17.0
November	16.0
December	15.0

A.3

CORRELATION COEFFICIENT MATRIX
OF BSE AND OTHER MARKETS
PRICE INDEXES
(5 Years Ending December 1988)

	INDIA
USA	0.01
JAPAN	0.01
ARGENTINA	0.12
BRAZIL	-0.08
CHILE	-0.03
GREECE	-0.02
KOREA	0.01
MEXICO	0.00
THAILAND	0.00
ZIMBABWE	0.20

Source: IFC Emerging Markets Data Base

A.4

AVERAGE NUMBER OF TRADING DAYS BY WEEK
ON THE BSE
1979-1990

WEEK 1	4.12 DAYS
WEEK 2	4.03 DAYS
WEEK 3	4.07 DAYS
WEEK 4	4.47 DAYS

A.5

STOCK MARKET PERFORMANCE
 (Converted Into U.S. \$)
 1990

MARKET	TOTAL RETURN	
	3 MONTHS	12 MONTHS
BSE	11 %	55 %
JAPAN	-6	-27
UK	-7	22
DENMARK	-7	23
NETHERLANDS	-8	11
BELGIUM	-11	3
AUSTRIA	-30	31
SWEDEN	-29	-7
FINLAND	-25	-29
NEW ZEALAND	-25	-31
SINGAPORE	-23	-1
BRAZIL	-48	-65
PHILIPPINES	-45	-59
TAIWAN	-39	-65
LATIN AMERICA	-20	-20
ASIA	-24	-46

Source: Morgan Stanley Capital International Perspective

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