MANAGEMENT REVIEW

Study of seasonality in Bombay Stock Exchange

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Abstract

In recent years the testing of seasonality in stock returns has become an active field of research in empirical finance and has been receiving attention from not only academic journals but also the financial press. Among the more well-known volatilities are the size effect, the month effect and the day-of-the week effect. The day of the week effect is a phenomenon that constitutes a form of anomaly of the efficient capital markets theory. According to this phenomenon, the average daily return of the market is not the same for all days of the week, as we would expect on the basis of the efficient market theory. Month of the year effect would exist if returns on a particular month are higher than other months. This paper attempts to investigate the presence of seasonal effects in the Bombay Stock exchange(BSE) through week day effect and month of the year effect . The closing price of SENSEX has been taken for 17 years, from 1993 to 2009. Variety of statistical techniques have been used to see if any seasonality is present in the Bombay Stock exchange.

Keywords

Stock market, Seasonality, Day of the week effect, month of the year effect

Introduction

Earlier studies have found the existence of the day of the week effect not only in the USA and other developed markets but also in the emerging markets like Malaysia, Hong Kong, Turkey). For most of the western economies, (U.S.A., U.K., Canada) empirical results have shown that on Mondays the market has statistically significant negative returns while on Fridays statistically significant positive returns. In other markets such as Japan, Australia, Singapore, Turkey and France the highest negative returns appear on Tuesdays. The most satisfactory explanation that has been given for the negative returns on Mondays is that usually the most unfavorable news appears during the weekends. These unfavorable news influence the majority of the investors negatively, causing them to sell on the following Monday. The presence of calendar anomalies has been documented extensively for the last two decades in financial markets. The most common are , the month effect and the day-of-the week effect . The day of the week patterns have been investigated extensively in different markets. Studies (Cross 1973; French 1980; Keim and Stambaugh 1984; Rogalski 1984; Aggarwal and Rivoli 1989) document that the distribution of stock returns varies according to the day of the week. The average return on Monday is significantly less than the average return over the other days of the week. The day of the week regularity is not limited to the U.S. equity market. It is also documented that the day of the week regularity is present in other international equity markets (Jaffe and Westerfield 1985; Solnik and Bousquet 1990, Barone 1990, among others) and other financial markets including the futures market, treasury bill market, and bond market (Cornell 1985; Dyl and Maberly 1986). It is important to know whether there are variations in volatility of stock returns by day of the week patterns and whether a high (low) return is associated with a corresponding

high (low) return for a given day. Having such knowledge may allow investors to adjust their portfolios by taking into account day of the week variations in volatility. For example, Engle (1993) argues that investors who dislike risk may adjust their portfolios by reducing their investments in those assets whose volatility is expected to increase. Finding certain patterns in volatility may be useful in several ways, including the use of predicted volatility patterns in hedging and speculative purposes and use of predicted volatility in valuation of certain assets specifically stock index options.

The presence of anomalies in international financial markets can be a clear sign that a lack of integration among these markets exists, thus investment opportunities derived from different behaviours in the generation of returns are available. Several studies have centred on relative anomalies in the seasonality of distinct financial markets of developed countries as an explanation to why there is an absence of integration between international financial markets. The growing use of daily data has led to additional research in the financial literature, specifically extending the analysis of seasonal behaviour to include the day of the week effect, the weekend effect and the month of the year effect. The financial literature on this topic has offered several justifications for these anomalies.

A common problem in the low and slow growth of small developing economies is the swallow financial sector. Financial markets play an important role in the process of economic growth and development by facilitating savings and channeling funds from investors to company. Volatility may impair the smooth functioning of the financial system and adversely affect economic performance. Similarly, stock market volatility also has a number of negative implications. A rise in stock market volatility can be interpreted as a rise in risk of equity investment and thus a shift of funds to less risky assets. This move could lead to a rise in cost of funds to firms and thus new firms might bear this effect as investors will turn to purchase of stock in larger, well known firms. While there is a general consensus on what constitutes stock market volatility and, to a lesser extent, on how to measure it, there is far less agreement on the causes of changes in stock market volatility. Some economists see the causes of volatility in the arrival of new, unanticipated information that alters expected returns on a stock. Thus, changes in market volatility would merely reflect changes in the local or global economic environment. Others claim that volatility is caused mainly by changes in trading volume practices or patterns, which in turn are driven by factors such as modifications in macroeconomic policies, shifts in investor tolerance of risk and increased uncertainty. So the study on seasonality in BSE which is the major indicator of Indian Stock Market can help forecasters and also the investors for the analysis of their investment.

Objective of the Study:

The objective of the study is to examine the seasonality in the Bombay Stock Exchange .More specifically the objective of the study are:

1. To find out the day of the week on which the BSE return is the highest and the day on which it is lowest.
2. To examine the month of the year pattern for the highest and that for the lowest market returns in BSE.
3. To study the significance of seasonality in returns across different days of the week and different months of the year.

Literature Review

There is a large number of literature on the day of the week effect and months of the year effect. In fact, studies on such stock market anomalies started since the late 1930 where Kelly (1930) revealed the existence of a Monday effect on the US markets. From thereon, researchers have documented findings in support of the low Monday returns in the US markets. Fields (1931) studied the day of the week effect and was of the opinion that the security prices declined on Saturday and this was because of the unwillingness of traders to carry their holdings over the uncertainties of a week-end which led to liquidation of long accounts. Cross (1973) using the standard and poor's 500 index showed that the Monday returns were negative and the Friday returns were very high in the U.S stock market. Officer (1975) detected the presence of seasonality in Australian stocks market. In fact, according to French (1980), firms intentionally delay announcements of bad news until the weekend in order to prevent the market from disruption. Moreover, some researchers5 have documented on a settlement period hypothesis to explain day of the week effects. In all markets, there is a time lag between payment and trading of securities. Lakonishok and Levy (1982) also in their studies inferred that no particular day of the week effect was found out in the U.S.A stock market after the period 1974.

Keim and Stambaugh (1984) studied the day of the week effect for the period 1928 to 1982 and found out that Monday returns were consistently negative but gained no significant differences in the aveage returns in the later period after 1973. Smirlock and Starks (1986) found that aside from positive first-hour returns, hourly returns on Mondays were negative and lower than their counter parts on other trading days. Santesmases (1986)using the Madrid Stock Exchange Index and the daily returns of 40 samples studied the seasonality for the period January 1979 to December 1983 and revealed that there was no confirmation of presence of the day of the week effect in the Spanish market. Flannery and Protopapadakis (1988) investigated for the period 1976 to 1984 and observed that intra-week seasonality particularly negative Monday returns still continued to be significant. Damodaran (1989) in his study had tried to explain the Week-end effect on the basis of information release hypothesis which stated that "Firms have a tendency to release adverse information after trading closes for the Week-end". Solnik and Bousquet (1990) test day of week effect for Paris Bourse, reporting a strong

and persistent negative return on Tuesday, which is in line with studies on Australia and Japan. Chaudhury (1991) studied the seasonally in share returns particularly the day of the week effect in the Indian context for the period June 1988 to January 1991. He observed that return on Monday was negative. But what was more interesting to note that Tuesday's mean return was having a still higher negative value. Tang (1993) studied the day of the week effect for the period January 1980 to December 1989 by taking Dow Jones Industrial Average and observed that the Monday effect existed for the said period. Lin and Lim (2001) argued that there might be a link between the US Monday seasonal and the Asia-Pacific DOW effect as they are one -day out of phase due to their different time zones. Moreover, Nath and Dalvi (2004) examined the week day effect in the Indian equity market and found evidence of Monday and Friday effects before the rolling settlement in 2002. Bodla and Jindal (2006) studied Indian and US market and found evidence of seasonality. Kumari and Mahendra (2006) studied the day of the week effect using data from 1979 to 1998 on BSE and NSE. They reported negative returns on Tuesday in the Indian stock market. Moreover, they found returns on Monday were higher compared to the returns of other days in BSE and NSE. Choudhary and Choudhary (2008) studied 20 stock markets of the world using parametric as well as non-parametric tests. He reported that out of twenty, eighteen markets showed significant positive return on various day other than Monday.

Among the pioneering works, Wachtel (1942) documented the January effect and found that the Dow-Jones Industrial Average from 1927 to 1942 showed frequent bullish tendencies from January to December. Kinney (1976) whose study was based on the New York Stock Exchange showed that the average returns were 3.5% in January compared to 0.5% for other months for the period 1904 to 1974. Banz (1981) reported that returns of small firms were significantly higher in January than those with large market values, James and Edmister (1981) had also observed that there existed the January effect in the stock market. Keirn (1983) noted that daily abnormal return distributions in January have large means relative to the remaining 11 months. Lakonishok and Smidt (1984) had also confirmed the January effect in their study. Berges, Mc Connell and Sclarbaum (1984) investigated the January effect in Canada stock market for the period 1951-80 and had a strong evidence in favour of January effect Jones, Pearce and Wilson (1987) tested the presence of January effect over roughly 50 years . They also found out that January effect existed prior to income taxation. Additionally, Bhabra, Dhillon and Ramirez (1999) found evidence of excess trading activities in the month of December for the period 1980 to 1994 on the NYSE/AMEX monthly returns and associated this excess trading to tax related changes. Easterday and Stephan (2006), re-examined the joint small firm/January effect proposed by Keim (1983), over a 62-year period of study but break it into three distinct sub-periods: 1963-1979 (the same years as in Keim 1983), 1943-1962 and 1980-2004.They found that during the Keim period (1963-79), the returns in January for small firms were significantly higher to other months but for the and post Keim period the returns were remarkably lower.

Bombay Stock Exchange – an Overview

The stock markets in India have an important role to play in the building of a real shareholders democracy. A market, which deals in securities that have been already issued by companies, is known as the secondary market or stock Market. For the efficient growth of the market, a Sound secondary market is an essential requirement. There are currently 23 recognized stock exchange in India of which 4 are national and 19 are regional exchanges. The four national level exchanges are Bombay Stock Exchange (BSE), National Stock Exchange (NSE), Over the Counter Exchange of India (OTCEI) and Inter-connected Stock Exchange of India (ISE). All these exchanges operate with due recognition from the government under the Securities & Contracts (Regulations) Act, 1956. The overall development and regulation of the securities market was entrusted to the Securities and Exchanges Board of India (SEBI) by an act of Parliament in 1992. There are stringent regulations to ensure that directors of joint stock companies keep their shareholders fully informed of the affairs of the company.

The first stock exchange in India was started in Bombay in 1875. BSE was established in 1875 under the name of "The Native Share & Stock brokers Association". It is the oldest Stock exchange in Asia. In March 1995, BSE has introduced screen based trading called BOLT (BSE on-line trading). The bolt is designed to get best bids and offers from jobbers' book as well as the best buy and sell orders from the order book. Slowly the network is being extended to other cities too. Now the BOLT has a nation wide network. Trading work stations are connected with the main computer at Mumbai through Wide Area Network (WAN) .The capacity of the tandem hardware of BOLT is 5,00,000 trades per day(in 6 hours i.e from 9:30 a.m to 3:30 p.m).

The most visible and tracked parameter of any stock market is the movement of the stock index. This is just a number that helps to measure the movement of the market against a benchmark index, taken as 100, on a base year. Most stock indices attempt to be proxies for the market they exist in. Each stock exchange has a flagship index like the Sensex of BSE or the Nifty of NSE. An index is calculated daily by tracking the share prices of its constituent member companies. For example, the Sensex is an index comprising 30 component stocks representing a sample of large, well established and leading companies while the Nifty consists of 50 company stocks. Sensex and Nifty are calculated using market capitalization weighted method. Every index is associated with a base year. For example, the base date for Sensex is 1st April 1979 and for the Nifty is 1st April 1995 .This means that the Sensex and Nifty were assumed to be 100 on these respective base dates. It may be interesting to know that Sensex actually came into existence only on 1st January, 1986, when the

index was computed at 598.53. In fact, the base date does not have any significance beyond the introduction date, since for all the subsequent days the index is calculated by comparing the previous day's value.

Research Methodology

The data for this study consists of BSE that comprise of daily closing price of SENSEX for the period 1993-2009. Various statistical analysis has been done and the P value is used to test the significance. Daily stock prices have been converted to daily returns. The present study uses the logarithmic difference of prices of two successive periods for the calculation of rate of return. The return has been calculated on the basis of the model:

$r_t = l_n (I_t/I_{t-1}) \times 100$

where

r_t = Return on equity price

ln = Natural logarithm

I_t = The closing index of BSE on a day, month as the case may be

I_{t-1} = The closing index of BSE on the preceding day, month as the case may be

(i) *Day of the week effect*

Hypothesis (Ho): $a_1 = a_2 = a_3 = a_4 = a_5$

Where a_1 to a_5 are the mean return for each day-of-the-week

If this hypothesis is rejected, it would imply that the mean daily returns are significantly different from each other, i.e. there is seasonality in returns across different days of the week.

(i) Month of the year effect

Hypothesis (Ho):
$b_1=b_2=b_3=b_4=b_5=b_6=b_7=b_8=b_9=b_{10}=b_{11}=b_{12}$

Where b_1 to b_{12} are the mean return for each month of the year .

If this hypothesis is rejected, it would imply that the mean monthly returns are significantly different from each other, i.e. there is seasonality in returns across different months of the year.

Analysis of Data and Results

The table 1 below provides summary statistics for daily Nifty returns across the days of the week for 17 years from 1993-2009.

TABLE I
SENSEX - DAY OF THE WEEK EFFECT

It is observed from the Table No. 1.that the mean returns for Tuesday is the lowest. The highest average return is observed on the Wednesday. The standard deviation as a measure of volatility is found to be the highest on Monday and the lowest on Tuesday. The return distributions are positively skewed on Monday and Wednesday. And all other days it is negatively skewed. The Wednesdays return distribution is more skewed that of the other days. For normal curve the value of kurtosis is 3, which is called as Mesokurtic. When the value is more than 3, the curve is said to be Leptokurtic. When it is less than 3, the curve is called as platykurtic. Leptokurtic distribution means sharper than a normal distribution, with values concentrated around the mean and thicker tails. This means high probability for extreme values. So here the return distributions are observed to be leptokurtic by nature on Monday, Tuesday and Friday. Platykurtic distribution is flatter than a normal distribution with a wider peak. The probability for extreme values is less than for a normal distribution, and the values are wider spread around the mean. So here the return distributions are observed to be platykurtic by nature on Wednesday and Thursday.

P-value is a measure of how much evidence you have against the null hypothesis. The smaller the p-value, the more evidence you have. One may combine the p-value with the significance level to make decision on a given test of hypothesis. In such a case, if the p-value is less than some threshold (usually .05, sometimes a bit larger like 0.1 or a bit smaller like .01) then you reject the null hypothesis. Here the calculated P value is more than .05. So the variation in returns across different days of the week in BSE is not significant at the 5% level, i.e. the null hypothesis is accepted. This suggest that no evidence in favour of the day of the week effect. The results are in sharp contrasts with the findings of Gibbons and Hess (1981), Mills and Coutts (1995), and Arsad and Coutts (1997) where the significant day of the weeks effects were noted in the US and UK markets.

Table II
Sensex - month of the year effect

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Mean	0.4116	2.0219	-3.1177	-3.1177	0.9731	1.1430	1.7884	2.2337	0.1746	-2.6499	2.4317	4.2603
Standard Deviation	8.4459	6.0470	8.2969	8.2969	10.6677	8.1502	6.0267	6.4971	8.2995	9.2211	8.5255	4.3649
Kurtosis	-0.1169	0.0796	-0.9366	-0.9366	0.5097	1.8746	-0.3806	-0.3162	-1.2155	2.3953	-0.4570	1.4863
Skewness	0.1088	0.3053	0.0805	0.0805	0.4416	-1.1225	-0.8695	-0.3082	-0.3461	-0.7944	-0.1321	0.1687
Observations	16	17	17	17	17	17	17	17	17	17	17	17
P-value	0.77	0.46	0.59	0.86	0.46	0.52	0.95	0.79	0.82	0.57	0.66	0.35

It is observed from the Table No. 2. that the mean returns are negative for the month of March, April and October. The mean returns of March and April is found to be the lowest and that for the December is the highest. The standard deviation which measures the volatility of share returns is found to be the highest in the month of May followed by October. The least fluctuation in share returns is in December. The skewness of return distribution is found to be the highest in the month of May. Here all the months have a platykurtic return distributions, i.e the probability for extreme values is less than for a normal distribution, and the values are wider spread around the mean .The calculated P value is more than .05. So the variation in returns across different month of the year in BSE is not significant at the 5% level, i.e. the null hypothesis is accepted. This suggest that no evidence in favour of the month of the year effect. The results, on overall, do not seem to have a strong support in the month of the year seasonality. It seems that returns are not more or less random, consistent with the efficient market hypothesis.

Conclusion

This paper has investigated day of the week effects in the BSE for 17years from 1993 to 2009.The results, on overall indicate no significant presence of the day of the week effect for the whole period. This paper also investigated there is no existence of the month of the year effect in BSE. This analysis heavily supports the predictions of efficient market hypothesis that the returns are not dependent on all the months of the year. These above results undoubtedly call for further research on the presence of a week day effect and month of the year effect based on individual securities.

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