THE EFFECT OF SEASONALITY OVER STOCK EXCHANGES IN INDIA

Dr. Silky Vigg Kushwah[1] and Ms. Sulekha Munshi[2]

ABSTRACT

Seasonal variations in production and sales are a well-known fact in business. Seasonality refers to regular and repetitive fluctuation in a time series which occurs periodically over a span of less than a year. The main cause of seasonal variations in time series data is the change in climate. Besides customs and tradition, economic variables also affect stock market returns. Similarly, stock returns exhibits systematic patterns at certain times of the day, week or month. The most common of these are monthly patterns; certain months provide better returns as compared to others i.e. the month of the year effect. The objective of this paper is to analyse whether the study of seasonality can help the investors to formulate such strategies to outperform during specific events and earn high returns.

Keywords: Seasonality, Market Anomalies, Repetitive fluctuation

INTRODUCTION

Seasonal variations in production and sales are a well-known fact in business. Seasonality refers to regular and repetitive fluctuation in a time series which occurs periodically over a span of less than a year. The main cause of seasonal variations in time series data is the change in climate.

Besides customs and tradition, economic variables also affect stock market returns. Similarly, stock returns exhibits systematic patterns at certain times of the day, week or month. The most common of these are monthly patterns; certain months provide better returns as compared to others i.e. the month of the year effect. Similarly, some days of the week provides lower returns as compared to other trading days i.e. days of the week effect.

Market Anomalies are market patterns that do seem to lead to abnormal returns more often than not, and since some of these patterns are based on information in financial reports, therefore market anomalies pose an opportunity to study them and form such a trading strategy to earn better returns.

The existence of seasonality in stock returns however violates an important hypothesis in finance that is efficient market hypothesis. The Efficient Market Hypothesis (EMH) states that all stocks are properly priced, and that abnormal returns cannot be earned by searching for mispriced stocks. Furthermore, future stock prices follow a random walk pattern, they cannot be predicted. The presence of seasonality in stock returns violates market efficiency principle because equity prices are no longer random and can be predicted based on past pattern. This facilitates market participants to devise trading strategy which could fetch abnormal profits on the basis of past pattern. Various studies took place and seasonal component is being recorded. They are called calendar anomalies (effects).

In study of anomalies, 3 different types of anomalies are found such as:

1. Calendar based Anomalies	2. Announcement based Anomalies
• End-of-the-Day-effect	• Earning-Surprise effect
• Holiday effect	• Information Releasing Hypothesis
• Intra-Day effect	
• January effect	
• Monday/Week-End effect	• IPO's, Seasonal Equity Offerings and Buy-Backs
• Monthly/Turn-of-the-Month effect	
• Tax-Year effect	
• Week-of-the-Month effect	• Pay-Out effect
• Day-of-the-Week effect	• P/E Ratio effect

[1] Associate Professor, New Delhi Institute of Management, New Delhi, India
[2] Assistant Professor, Aditya Institute of Management, Science & Research, Mumbai, India.

3. Announcement based Anomalies	4. Other Anomalies
• Earning-Surprise effect • Information Releasing Hypothesis • IPO's, Seasonal Equity Offerings and Buy-Backs • Pay-Out effect • P/E Ratio effect	• Book-to-Market effect • Low-Beta-Firm effect • Low Price Stock effect • Momentum effect • Reversion to the Mean effect • SEO Underperformance effect • Size effect • Weather effect

In this paper we have conducted researchover returns of Nifty 50 for a period of 10years i.e. 2007-2017. We have considered 4 events to study seasonality. They are:

  ➢ Budget week

  ➢ Change in financial year

  ➢ Change in calendar year

  ➢ Diwali week

1. **Budget week**

    One of most awaited week of whole year is budget week. On this day government announces its fiscal policy for the next one year. Here government presents their proposed revenue and expenses for the coming financial year. A significant portion of market sentiments are attached with this event. i.e. it is being considered for study. The date when budget was presented is considered as event date. Returns a week before and after the event are considered.

2. **Change in financial year**

    A new financial year starts from 1st April. Prominent change in books of accounts of every company has a significant effect on every financial transaction took place. Therefore, it is considered as a significant event. The date 1st April is treated as event date. Returns a week before and after the event are considered.

3. **Change in calendar year**

    A new calendar year starts from 1st January. The last week of calendar year i.e. 25 December to 31st January have 2 big effects like Christmas, New Year eve. i.e. to obtain the good sentiments of market 1tJanuary is taken as event date. Returns a week before and after the event are considered.

4. **Diwali week**

    One of the most auspicious day for Indians is Diwali. As every business encounter higher number of sales in this week. Therefore, returns occurring in market before and after the event are considered for study. The date on which Diwali occur (different in every year) is considered as event day.

LITERATURE REVIEW

Several studies have been conducted to examine the effect of seasonality over nifty 50 returns. Researchers used the concept of EMH (Efficient Market Hypothesis). This means efficient market hypothesis is a central paradigm in finance. The EMH relates to how quickly and accurately the market reacts to new information. New data are constantly entering the market place via economic reports, company announcements, political statements, or public surveys. If the market is informational efficient then security prices adjust rapidly and accurately to new information. According to this hypothesis, security prices reflect fully all the information that is available in the market. Since all the information is already incorporated in prices, a trader is not able to make any excess returns. Thus, EMH proposes that it is not possible to outperform the market through market timing or stock selection. However, in the context of financial markets and particularly in the case of equity market

seasonal component have been recorded. They are called calendar anomalies (effects) in literature. Presence of seasonal anomalies contradicts the concept of EMH.

On this one of the studies carried out by Ash Narayan Sah () illustrates that Nifty returns do get effected by seasonal abnormalities. Here he had found the effect of days of week, weekend effect and seasonality returns effect over S&P Nifty 50. Nifty 50 is being taken as a representative of stock market. The monthly data on S&P Nifty for the period from April 1997 to March2009 is collected from NSE Website. He has used statistical tools i.e. descriptive statistics and Annova to examine its effect. The study concluded daily and monthly seasonality over Nifty 50. The presence of seasonality effect over nifty is statistically significant. The results established that the Indian stock market is not efficient and investors can improve their returns by timing their investment.

Kumar & Ravidarshini (2010) conducted a study to examine April Anomaly And return predictability in stock market. The effect is studied over 5 indices. The returns were collected for a period of 10 years. The indices used were S&P CNX Nifty, CNX Nifty junior, CNX Midcap, CNX IT and Bank Nifty. In study statistical tool like descriptive statistics, dummy variable regression, Mann-Whitney U test, Kruskal-Wallis test is used and hypothesis is tested whether there exist effect of seasonality over stock exchanges. This study concluded that there is presence of statistically significant effect over Nifty. January Anomaly is specifically found over exchanges returns.

Kumar & Jawa (2017) studies the effect of calendar events on stock market specifically Indian Market. It studies the day of week, weekend and month of the year returns effect over Nifty. The study uses the Arch Model and uses Hypothesis to check the test. The study concluded the presence of seasonal abnormalities over stock exchanges returns. Harish & Sathyanaryana (2017) examined the calendar month anomaly returns over Sensex. For this, BSE 30 index is used as a representative of stock market. Tools like descriptive statistics are used to understand relationship between stock exchange and seasonal anomaly. It has found that there is no significant presence of anomaly returns over exchange returns. Khanna (2014) observes the day of the week effect over stock markets. Sensex index is taken and returns of it are studied. The daily stock price data of the Sensex has been taken for the period of January 31, 2006 upto December, 31 2010. For returns of working days, logathim returns are used. For further analysis ARIMA (Autoregressive Integrated Moving Average) model has been constructed, descriptive statistics are used. Study observed that there is an existence of relationship between days of week returns effect over stock exchanges.

Sarma(2004) studies the effect of seasonality on stock exchanges of emerging markets. Three indexes are used in the study SENSEX, NATEX, BSE 200. Tools like descriptive statistics are used. In order to check test hypothesis are used. Data is collected for a period, January 1st 1996 to August 10th 2002. In study different patterns are made for investment strategies using seasonality effect in order to make greater gains. Study observed presence of seasonality in stock exchanges return. Brooks & Persand (1999) studied seasonality in Southeast Asian stock markets. The study examine day of week effect over different stock exchanges. South Korea, Malaysia, the Philippines, Taiwan and Thailand stock exchanges are considered. Market risk, proxied by the return on the FTA World Price Index, is not sufficient to explain this calendar anomaly. Although an extension of the risk-return equation to incorporate interactive seasonal dummy variables can explain some significant day-of-the week effects, market risk alone appears insufficient to characterise this phenomenon. Data is collected from 31 December, 1989 to 19 January, 1996 (a total of 1581 observations). Tools like CAPM Model and market model is used as statistical tools to analyse the data.

Archana et.al. (2014) conducted a study analyzing calendar effect and stock split effect over stock exchanges return. The study measures the existence of market anomalies with respect to BSE SENSEX Index from 2008 – 2012. The closing price and turnover of BSE index for a period of 5years has been taken for the study. Daily return, average return per month , average return per day for all 5 years were tabulated for analysis. The closing price of the companies before and after stock split was taken to understand the impact of stock split on the market movements. For the study of stock split of 5 companies from different industries are selected, say Bajaj Corporation, HDFC Bank,Jindal steel, Oriental Hotels, Tata steel. Menahem (2004) conducted a study and in it he examines the effect of end of month returns over stock market. The data is collected daily returns for the period from July 1962 through December 1993, which includes a total of 7,927 daily observations. They employ three indices in our analyses: the NYSE value-weighted index, the NYSE equally-weighted index, and the S&P 500 index. Tools like GARCH Model are used to analyse the data.

Aggarwal & Tandon (1994) observe the seasonal anomaly over different stock exchanges. Study is conducted over 18 countries stock exchanges. Research paper studies the day of week effect, turn of month effect, December end month effect , month of year effect (January month). Data is collected for a period from 1971 to 1987 on 18 exchanges. The countries taken into consideration are :- Australia , Brazil, Belgium , Canada , Denmark, France , Germany, Hong Kong , Italy, Japan, Luxembourg , Mexico, Netherland, New Zealand, Singapore, Sweden, Switzerland, UK, USA. Desai & Josh (2015) see the seasonal anomalities in stock exchanges with respect to some blue chip stocks. Research is made to form trading strategies over following stocks in order to gain at the period of seasonality. Study is made on S&P Nifty Index, BSE Sensex, BSE 100 and stocks ACC, BHEL, Bank of India, Colgate, GAIL, Infosys, ONGC, RIL, SBI, Sesa Goa,

Sun Pharma, Tata Steel and Wipro. Data is collected for a period from January 2000 to October 2015. Tools used to analyse the data z- test for day of month effect and t-test for day of week effect and week of month effect over stock exchanges. Study found seasonal effects present in Indian stock Markets. It found day of the month and week of the month effect to be present. For securities tested, only WIPRO did not have any seasonality. Rest other stocks have seasonal effects in their returns.

Angelovska (2013) does an econometric analysis of market anomaly - Day of the week effect on a small emerging market. The selected stock exchange index is MBI10 Index (Macedonian Stock Market). Data is collected for a period January 4, 2005 to December 31, 2009.Tools like descriptive statistics, regression and Annova and Garch model are used to analyse this data. The study concludes returns are not evenly distributed across days of the week. So there is presence of seasonality in stock exchanges. Investors can use these finding to have abnormal gain.

After studying the vast literature, it has been observed that lots of work has been done on seasonality in India and abroad. The results of the above-mentioned study are mixed. Some studies support the existence of seasonality and some studies don't support it. Moreover, none of the studies were found that analysed the events like Budget announcement and Diwali festival. This study tries to understand and analyse the impact of these events on the returns of Indian stock market.

RESEARCH DESIGN AND METHODS

The research study is conclusive in nature as its motive to find the relationship between seasonality effects over stock exchanges. Nifty 50 has been taken as reference for stock exchanges returns. The population contains all the returns given by nifty 50 in pre-described duration..S&P CNX Nifty 50 has been taken as sample. Last 10 years returns have been taken. It comprises returns of nifty for the duration of 10 years from 2007-2017.Judgment sampling technique i.e. non random

sampling technique has been used. Secondary data of stock exchanges i.e. The data has been collected from the national stock exchange website for nifty returns for the period of 10 years i.e. 2007-2017.The method of data analysis used in this research work is the descriptive statistics and paired sample t-test. In order to test the hypotheses concerning the relationship between the dependent and independent variables was used.

Hypotheses formed

H1: There is no significant difference in nifty returns before and after Diwali event

H2: There is no significant difference in nifty returns before and after Budget event

H3: There is no significant difference in nifty returns before and after change in financial year.

H4: There is no significant difference in Nifty returns before and after change in calendar year.

DATA ANALYSIS AND INTERPRETATION

The impact of 4 events i.e. budget week, Diwali week, change in financial year, change in calendar year has been assessed. The Nifty 50 is used as a representative of stock exchanges. For analysis, logarithmic returns of closing prices on 5 days before and after the event have been assessed using MS- Excel. The nifty returns are being assessed using paired sample t-test.

The first hypothesis states that there is no significant difference on Nifty returns before and after the Diwali event. The duration for analysis is taken from 2007 to 2017. Paired sample t-test have been used to compute the results in excel and their results are as under :

Table 1: Paired sample t-test

Hypothesized Mean Difference	0.000
Df	4
t Stat	0.869795053
P(T<=t) one-tail	0.216747136
t Critical one-tail	2.131846786
P(T<=t) two-tail	0.433494271
t Critical two-tail	2.776445105

Table 2: Descriptive Results

Descriptive	Bef. Diwali	Aft Diwali
Mean	-0.003280093	-0.0460674
Standard Error	0.001860014	0.0477296
Median	-0.003248226	0.00040608
Standard Deviation	0.004159117	0.10672662
Sample Variance	1.72983E-05	0.01139057
Kurtosis	1.721006092	4.96778972
Skewness	-0.045656771	-2.2271945
Range	0.011679449	0.24242721
Minimum	-0.009158677	-0.2368332
Maximum	0.002520773	0.00559403
Sum	-0.016400467	-0.2303369
Count	5	5
Confidence Level(95.0%)	0.005164226	0.13251861

Interpretation

Avgbd = average before Diwali
Avgad = Average after diwali

Paired sample statistics (table 1) indicates that there are 5 observations before and after the diwali event. It also shows their mean and standard deviation. Pearson correlation (0.7790) indicates towards positive correlation between both variables.

Table 2 gives the mean value of both the variables and standard error which is used in computing both the test statistic and the upper and lower bounds of the confidence interval. The p-value is 0.433 which is greater than 0.05. This indicates that the null hypothesis is accepted and samples are not statistically significant. Therefore, there is no significant difference on Nifty 50 returns due to this event.

The second hypothesis states that there is no significant difference on Nifty returns before and after the budget event. The duration for analysis is taken from 2007 to 2017. Paired sample t-test has been used to compute the results in excel and their results are as under:

Table 3: Paired sample t-test

Hypothesized Mean Difference	0
Df	4
t Stat	1.638453
P(T<=t) one-tail	0.088335
t Critical one-tail	2.131847
P(T<=t) two-tail	0.17667
t Critical two-tail	2.776445

Table 4: Descriptive Results

Descriptive	Bef. Budget	Aft. Budget
Mean	0.056024	-0.07611
Standard Error	0.05594	0.074383
Median	-0.01592	-0.00164
Standard Deviation	0.125085	0.166326
Sample Variance	0.015646	0.027664
Kurtosis	0.048212	-1.47833
Skewness	1.188333	-0.49423
Range	0.288628	0.410615
Minimum	-0.03916	-0.3003
Maximum	0.249467	0.110315
Sum	0.280119	-0.38055
Count	5	5
Confidence Level(95.0%)	0.155314	0.206521

Interpretation

Avgbb = average before budgetAvgab = Average after budget

Paired sample statistics (table 3) indicates that there are 5 observations before and after the budget event. It also shows variable's mean and standard deviation. Pearson correlation (0.2593) indicates towards positive correlation between both variables. Table 4 gives the mean value of both the variables and standard error which is used in computing both the test statistic and the upper and lower bounds of the confidence interval. The p-value is 0.088 which is greater than 0.05. This indicates that the null hypothesis is accepted and samples are not statistically significant. Therefore, there is no significant difference on Nifty 50 returns due to this event.

The third hypothesis states that there is no significant difference on Nifty returns before and after the change in financial year event. The duration for analysis is taken from 2007 to 2017. Paired sample t-test has been used to compute the results in excel and their results are as under:

Table 5: Paired sample t-test

Hypothesized Mean Difference	0
Df	4
t Stat	1.544942
P(T<=t) one-tail	0.098624
t Critical one-tail	2.131847
P(T<=t) two-tail	0.197248
t Critical two-tail	2.776445

Table 6: Descriptive Results

Descriptive	Bef. Fin Year	Aft. Fin Year
Mean	0.09559	-0.00187
Standard Error	0.064413	0.002198
Median	0.048222	-0.00093
Standard Deviation	0.144031	0.004914
Sample Variance	0.020745	2.42E-05
Kurtosis	3.713214	-2.74221
Skewness	1.891449	-0.25299
Range	0.350023	0.010892
Minimum	-0.00528	-0.00763
Maximum	0.344742	0.003261
Sum	0.477949	-0.00937
Count	5	5
Confidence Level(95.0%)	0.178838	0.006102

Interpretation

Avgbf = average before financial year Avgab = Average after financial year

Paired sample statistics (table 5) indicates that there are 5 observations before and after the budget event. It also shows variable's mean and standard deviation. Pearson correlation (0.614) indicates towards highly positive correlation between both variables. Table 6 gives the descriptive value of both the variables and standard error which is used in computing both the test statistic and the upper and lower bounds of the confidence interval. The p-value is 0.197 which is greater than

0.05. This indicates that the null hypothesis is accepted and samples are not statistically significant. Therefore, there is no significant difference on Nifty 50 returns due to this event.

The fourth hypothesis states that there is no significant difference on Nifty returns before and after the change in calendar year event. The duration for analysis is taken from 2007 to 2017. Paired sample t-test has been used to compute the results in excel and their results are as under:

Table 7: Paired sample t-test

Hypothesized Mean Difference	0
Df	4
t Stat	1.640855616
P(T<=t) one-tail	0.08808567
t Critical one-tail	2.131846786
P(T<=t) two-tail	0.17617134
t Critical two-tail	2.776445105

Table 8: Descriptive Results

Descriptive	Bef Cal year	Aft Cal Year
Mean	0.001499885	-0.00243
Standard Error	0.000251818	0.002265
Median	0.001746091	-0.00073
Standard Deviation	0.000563083	0.005064
Sample Variance	3.17062E-07	2.56E-05
Kurtosis	2.615658811	3.437266
Skewness	-1.661917021	-1.80551
Range	0.001369127	0.012653
Minimum	0.000553578	-0.01111
Maximum	0.001922704	0.00154
Sum	0.007499424	-0.01214
Count	5	5
Confidence Level(95.0%)	0.00069916	0.006288

Interpretation

Avgbc = average before calendar year
Avgac = Average after calendar year

Paired sample statistics (table 7) indicates that there are 5 observations before and after the budget event. It also shows variable's mean and standard deviation. Pearson correlation (-0.471) indicates towards negative correlation between both variables. Table 8 gives the mean value of both the variables and standard error which is used in computing both the test statistic and the upper and lower bounds of the confidence interval. The p-value is 0.176 which is greater than 0.05. This indicates that the null hypothesis is accepted and samples are not statistically significant. Therefore, there is no significant difference on Nifty 50 returns due to this event.

CONCLUSION

Seasonality study is one of the most tested studies in the stock market. Investors are quite eager to know that whether there are some possibilities on these events to earn abnormal profits and beat the market. The current study tried to analyse the impact of four major events on the returns of Indian stock market. The events analysed are budget, Diwali, change in financial year, change in calendar year. The results of the research indicated that these have no significant effect on nifty 50 returns. The results thus do not support the existence of seasonality in the Indian stock market as there was no significant difference in the returns of nifty before and after the four events considered in the study. So it can be concluded that investors cannot take the advantage of seasonality to book abnormal returns. It was also found that Diwali and Change in calendar year events have an inverse relationship with Nifty returns as they have negative correlation between them. While Budget announcement and change in financial year events have direct relationship with Nifty returns as there exists a positive correlation between them. Overall, the study doesn't support seasonal effects.

REFERENCES

Agrawal, Anup, and Kishore Tandon(1994), "Anomalies or Illusions Evidence from Stock Markets in Eighteen Countries," *Journal of International Money and Finance*, Vol. 13(1), pp.83-106.

Ariel, Robert. A.(1990), "High Stock Returns before Holidays: Existence and Evidence on Possible Causes," *Journal of Finance*, Vol. 45(5),pp.1611-26.

Sah, A.N. (2008). Stock Market Seasonality: A Study of the Indian Stock Market. NSE Research Paper. Available at www.nseindia.com/content/research/res_paper_final228.pdf

Bodla, B. S.; Jindal, Kiran. (2006) Seasonal Anomalies in Stock Returns: Evidence from India and the US Decision (0304-0941). Jan-Jun2006, Vol. 33 Issue 1, pp.163-178.

Brooks, Chris, and Gita Persand (2001), "Seasonality in Southeast Asian Stock Markets: Some New Evidence on Day-of-the-Week Effects," *Applied Economic Letters* Vol.8 (3), pp.155-158 DOI: 10.1080/13504850150504504

Choudhary, K and Sakshi Choudhary (2008), "Day-of-the-Week Effect: Further Empirical Evidence", Asia-Pacific Business Review, Vol. 4(3), pp.67-74

Dash, Mihir and Sabharwal, Mohit and Dutta, Anirban, Seasonality and Market Crashes in Indian Stock Markets (March 14, 2011). Available at SSRN: https://ssrn.com/abstract=1785112 or http://dx.doi.org/10.2139/ssrn.1785112.

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