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Study of Anomalies in Stock Market

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ABSTRACT:

In financial markets, Anomalies refer to situations when a security or group of securities performs different to the notion of efficient markets, where security prices are said to reflect all available information at any point in time. With the constant release and rapid dissemination of new information, sometimes efficient markets are hard to achieve and even more difficult to maintain. There are many market anomalies; some occur once and disappear, while others are continuously observed.

A market anomaly (or market inefficiency) is a price and/or rate of return distortion on a financial market that seems to contradict the efficient market hypothesis. Financial market anomalies are time series patterns observed in security returns. Anomalies are the indicators of inefficient markets; some anomalies happen only once and vanish, while others happen frequently, or continuously. Market anomaly can be defined as "Deviation from the presently accepted paradigm that is too widespread to be ignored, too systematic to be dismissed as random error and too fundamental to be accommodated by relaxing the normative system". In standard finance theory, financial market anomaly means a situation in which a performance of stock or a group of stocks deviates from the assumptions of efficient market hypothesis.

INTRODUCTION

1. DEFINITION

Literary meaning of an anomaly is a strange or unusual occurrence. The word anomaly refers to scientific and technological matters. It has been defined by George & Elton as irregularity or a deviation from common or natural order or an exceptional condition.



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Anomaly is a term that is generic in nature and it applies to any fundamental novelty of fact, new and unexpected phenomenon or a surprise with regard to any theory, model or hypothesis. Anomalies are the indicator of inefficient markets; some anomalies happen only once and vanish, while others happen frequently, or continuously. Tversky and Kahneman defined market anomalies as "An anomaly is a deviation from the presently accepted paradigms that is too widespread to be ignored, too systematic to be dismissed as random error and too fundamental to be accommodated by relaxing the normative system".

While in standard finance theory, financial market anomaly means a situation in which a performance of stock or a group of stocks deviate from the assumptions of efficient market hypotheses. Such movements or events which cannot be explained by using efficient market hypothesis are called financial market anomalies.

A market anomaly is any event or time period that can be used to produce abnormal profits on stock markets. Stock market anomalies occur on multiple equities and stock market indices across the world. They do not correspond with existing equilibrium models, where risk is the only factor which is likely to cause possible variations in stock market excess returns. The occurrence of patterns in time series of stock market returns, independent of time-varying risk, would indicate that not all relevant information is captured in stock prices, which is inconsistent with the EMH. Stock market anomalies exist in every form of the EMH and can be classified in different categories, like for example firm anomalies, accounting anomalies, event anomalies, weather anomalies and calendar anomalies.

The existence of seasonality in stock returns however violates an important hypothesis in finance that is efficient market hypothesis. The 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.



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LITERATURE REVIEW:

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The pioneering work on seasonality was done by Watchel (1942), who was the first to report "Seasonality in stock returns". Rozeff and Kinney (1976) studied the January effect in New York Exchange stocks, finding that average return for the month of January was higher than other months. He studied the January effect, along with size effects in stock returns. He found that January returns of small firms were significantly higher than large firms, providing evidence for the tax-loss-selling hypothesis. Similar effects were found by Reinganum (1983) and by Gultekin and Gultekin (1983). Brown et al. (1985) found evidence of December-January and July-August seasonal effects in the Australian stock market, with the latter due to a June-July tax year. On the other hand, Raj and Thurston (1994) found that the January and April effects in the New Zealand stock market were not statistically significant.

The day-of-the-week effect in stock market returns has also been extensively reported in developed and emerging stock markets, with lower mean returns on Mondays and higher mean returns on Fridays (Kelly, 1930; Hirsch, 1968; Cross, 1973; Gibbons and Hess, 1981; Smirlock and Starks, 1986; Jaffe and Westerfield, 1989). Several studies have also examined seasonality of stock returns in Indian stock markets.

Pandey (2002) examined seasonality in monthly returns of the BSE Sensex, finding evidence of the January effect. Bodla and Jindal (2006) also found evidence of seasonality in both Indian and US markets. Kumari and Mahendra (2006) studied the day-of-the-week effect in the BSE and the NSE, finding negative returns on Tuesday and relatively higher returns on Monday. Sah (2008) studied seasonality in S&P CNX Nifty, investigating both the day-of-the-week effect and the month-of-the-year effect, finding evidence for a Friday effect and monthly anomalies for July, September, December, and January. Elango and Al Macki (2008) studied the

Day-of-the-week effect in the NSE, finding evidence of the Monday effect, with lowest daily returns on Monday, and with highest daily returns on Wednesday. On the other hand, Elango and Pandey (2008) studied the month-of-the-year effect in the NSE, finding the presence of a



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January anomaly, with March and April having significant negative returns, and November and December showing significant positive returns. Patel (2008) also studied calendar effects in monthly returns in Indian stock markets, finding two distinct effects: a November-December effect, in which the mean returns for November and December were significantly higher than those in the other ten months, and a March-to-May effect, in which mean returns for the months March to May were significantly lower than those during the other nine months and they showed that these effects were independent of each other.

2. TYPES OF STOCK MARKET ANOMALIES

2.1 Day of the week effect: The day of the week effect, also known as the weekend effect exhibits relatively larger Friday returns as compared to Monday returns, where Friday is the last trading day of the week and Monday being the first. This is mainly attributable to the trading patterns of the individual investors. However, in the recent time period a reverse weekend effect has been observed where Monday returns have yielded more than the Friday returns contributed by the change in the trading pattern of investors. The increased trading activities of the institutional investors over the individual investors are responsible for the positive and larger Monday returns as compared to Friday returns

The Firms and Governments generally release good news between Monday and Friday and bad news on the week-ends. As a result, the bad news is reflected in lower stock prices on the next trading day (Mondays) and good news is reflected in higher stock prices on Friday.

2.2 Turn of the year effect: The Monthly Effect is a seasonal anomaly in the financial market where prices of securities increase in a particular month of the year is more than in any other month. This creates an opportunity for investors to buy stocks for lower prices before that month and sell them after their value increases in the following month. The reason for this phenomenon is that individual investors, who are income tax-sensitive and who disproportionately hold small stocks, sell stocks for tax reasons at the end of tax month (such as to claim a capital loss) and reinvest in the next month. They may sell some stocks that they've seen a loss on not because they don't impress them anymore, but because they can take those losses out of their tax amount.



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The January Effect refers to a pattern exhibited by stocks particularly small-cap stocks in which they've shown a tendency to rise during the last several trading days in December and then continue to rally throughout the first week of January. The January effect explains high stock market returns in this month, which marks the beginning of the year. As quoted in the financial literature size, window dressing and tax loss selling are three key contributors of the high returns in January as compared to December returns. Small size stocks tend to generate higher returns in January as compared to large stocks. Institutional investors window dress their yearend returns by selling losers and holding back winners.

2.3 Turn of the month effect: The turn of the month is well known effect on stock indexes which states that stocks prices usually increase during the last four days and the first three days of each month. The reason for presence of this anomaly is that during the first few days the investor would have liquid amount received in the form of salary with him. He tries to obtain returns from it by investing the amount is securities. During the last days of the month trading would be high because the investor would be low in cash. So he would sell off his securities at lower prices resulting in high volume of trading.

	BSE		NSE		
	Coefficients ($F_{11,947} = 1.828$)	t-stat	Coefficients ($F_{11,383} = 0.934$)	t-stat	
January	0.725	0.422	1.103	0.112	
February	5.382	2.182*	10.042	0.706	
March	-0.576	-0.239	-1.952	-0.138	
April	2.123	0.861	0.063	0.004	
May	-1.074	-0.444	-4.517	-0.315	
June	2.858	1.174	2.693	0.183	
July	2.015	0.822	-30.366	- 2.154*	
August	0.805	0.335	4.053	0.294	
September	1.731	0.711	1.110	0.079	
October	-2.111	-0.880	-5.461	-0.396	
November	-3.093	-1.270	-4.555	-0.325	
December	2.053	0.826	0.366	0.026	
Notes: *Significant at 5 per cent; **significant at 10 per cent					

Table IV. Ianuary effect

The other reason behind the turn of the month effect is due to the mental behaviour of the investors that they sell their shares at the end of the month and expect the positive change for the next month and release of new information at the end and start of the new month. Investors in this way get maximum benefit by selling at the end of the month and

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repurchasing at the start of the new month so that these incorporate new information.

2.4 Semi month effect: Semi month effect states that the stock market returns during the first half of the month are higher than the next half of a month. The reason being the optimistic nature during the first few days believing there would be high returns made on the investments. During the end of the month on the account of a deficit in the savings they would sell securities resulting in lower returns. The trading done during first half of month is of optimism whereas it is of pessimistic nature during the second half of the month.

3. OBJECTIVES OF THE STUDY

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This study examines the following anomalies which are seen in stock market. It intends to identify measure, examine and verify them.

- Monthly Effect
- Turn of the Month effect
- Semi Month Effect
- Day of the week Effect

CALENDER ANOMALIES	DESCRIPTION	Researcher conducting the work				
Weekend Effect	The stock prices are likely to fall on Monday. Means the closing price of Monday is less than the closing price of previous Friday	Smirlock & Starks (1986)				
Turn-of-the-Month Effect	The prices of stocks are likely to increase in the last trading day of the following month, and the first three days of next month.	Nosheen et al. (2007) Agrawal & Tandon (1994)				
Turn-of-the-Year Effect	This anomaly describes the increase in the prices of stocks and trading volume of stock exchange in the last week of December and the first half month of January.	Agrawal & Tandon (1994)				
January Effect	The phenomenon of small-company stocks to generate more return than other asset classes and market in the first two to three weeks of January is called January effect.	Keims (1983) Chatterjee & Manaiam (1997)				



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4. NEED FOR THE STUDY

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A big boom has been witnessed in Stock Markets in recent times. A large number of new players have entered the market and trying to gain market share in this rapidly improving market. Study of anomalies aid the investors in taking advantage of the asymmetry of information in the market. Investors may have opportunities to make use of the seasonal anomalies to earn abnormal return. The movements of stocks during particular times of the year, in particular stock markets can be observed and investments can be done accordingly. The anomalies could be identified by studying the price movements of the stock and the investors can invest wisely during these times.

5. SCOPE OF THE STUDY

MARKET INDEX

Stock Market Indices used in the study are Nifty 50, S&P 500, Hang Seng and FTSE 100.

FULL FORM

	1022101112
NIFTY 50	Nifty Fifty
S&P 500	Standards and Poors 500

Hang Seng Hang Seng

FTSE 100 Financial Times and London Stock Exchange

Data during the years 2005-2013 is taken into consideration. This time period is further categorized into the following time intervals:

- Pre Recession Period (2005-2007)
- Recession Period (2008-2010)
- Post Recession Period (2011-2013)

Data is collected from Google finance. Closing price of the index on every day has been taken for the study.



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6. LIMITATIONS OF THE STUDY:

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- The study being conducted is only during the years of 2005-2013.
- Daily closing prices are only used for the study
- The statistical tools used to test the hypothesis are T Test and F Test

7. RESEARCH METHODOLOGY:

Data and its sources:

Data for the study is collected from Indian, American, Japanese and London Markets.

Indices to be used for the study are Nifty 50, S&P 500, Hang Seng and FTSE 100.

Reasons for choosing the above indices are as follows:

NIFTY 50: The national stock exchange is the largest stock exchange in India in terms of trading volume and daily turnover. The 50 stocks that made up the NIFTY index are the prime stocks in terms of market capitalization and daily trading activity.

S&P 500: In the S&P Index stocks of various countries are traded. As a result this index is a reflection of the performance of the world's economy as a whole. The S&P 500 is designed to be a leading indicator of the world market and is meant to reflect the risk/return characteristics of the large cap universe.

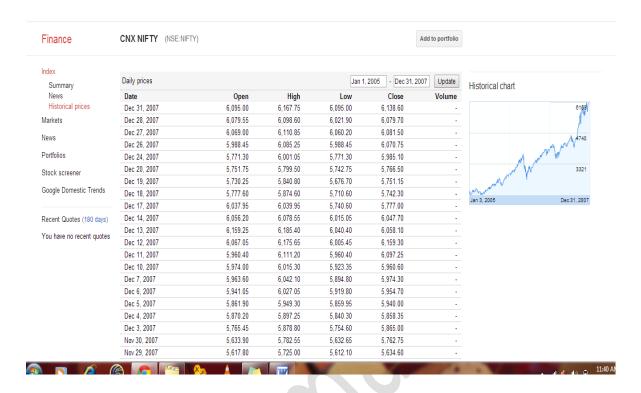
Hang Seng: Hang Seng is an index of China. China being the most popular economy in the world and the leader in novelty is one of the most significant and sought after indices that an investor must look forward to.

FTSE 100: FTSE is an index of London Stock Exchange. The Exchange is not only one of the oldest exchanges in the world, it is also one of the most prestigious, supplying high-quality prices, news and other information to the financial community, not just in the UK but across the world.

Data is collected from Google finance. Closing price of the index on every day has been

taken for the study.

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8. FORMULA USED:

Daily logarithmic market returns are calculated for a specified period using the following formula:

$$R_t = 100 * (Ln (P_t / P_{t-1}))$$

Where:

 R_t = Mean Return Compounds rate of change

Ln = Natural Logarithm

 P_t = Closing value of an Index at time t

 P_{t-1} = Closing value of an Index at time t-1.

The usage of Log Ratio used in the above formula has the advantage that returns of longer

periods can be calculated by multiplying the log ratios of intermediate periods.

Hypothesis used for the study are:

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H0: NULL HYPOTHESIS

There is no significant difference between the returns of two elements.

H1: ALTERNATE HYPOTHESIS

A difference between the returns of two elements can be seen.

STATISTICAL TESTS USED

To the chosen hypothesis, statistical tools have been used.

• **T-test:** T test is used to compare two different set of values. This test compares the mean of two samples. T test uses means and standard deviations of two samples to make a comparison.

Assuming equal variances, the test statistic is calculated as:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{s^2 \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} | s^2 = \frac{\sum_{j=1}^{n_1} (x_j - \overline{x}_1)^2 + \sum_{j=1}^{n_2} (x_j - \overline{x}_2)^2}{n_1 + n_2 - 2}$$

- where x bar 1 and x bar 2 are the sample means, s^2 is the pooled sample variance, n_1 and n_2 are the sample sizes and t is a Student t quantile with $n_1 + n_2 - 2$ degrees of freedom.

• ANOVA (F-Test): Analysis of variance (ANOVA) is a collection of <u>statistical</u> models used to analyze the differences between group means. ANOVA is used to compare differences of means among more than 2 groups.

F Calculated=MSTR/MSE

MSTR=Mean Square Treatment=SSTR/(c-1)



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MSE=Mean Square Error=SSE/ (N-c)

SSTR=Treatment of Sum of Squares

SSE=Error Sum of Squares

N= Total number of cells/elements

C=Total Number of Columns

9. FINDINGS AND RESULTS

Weekend Effect

Null Hypothesis:

H0 = Return Monday = Return Tuesday = Return Wednesday = Return Thursday = Return Friday

Alternate Hypothesis:

H1=ReturnMonday \neq ReturnTuesday \neq ReturnWednesday \neq ReturnThursday \neq ReturnFriday

Study Period	INDEX	F calculated	F Tabulated	HYPOTHESIS RESULT
PRE	FTSE 100	2.3839774	2.38388541	Null Hypothesis is rejected
RECESSION	HANG SENG	1.034597	2.38399911	Null Hypothesis is accepted
2005-07	NIFTY 50	.113940	2.22625628	Null Hypothesis is accepted
	S & P 500	1.239649	2.38393387	Null Hypothesis is accepted
RECESSION	FTSE 100	.8262888	2.38385332	Null Hypothesis is accepted
2008-10	HANG SENG	.24788	2.38388541	Null Hypothesis is accepted
	NIFTY 50	2.2426273	2.22637318	Null Hypothesis is rejected
	S&P 500	1.099892	2.38388541	Null Hypothesis is accepted
POST	FTSE 100	2.512064	2.38390152	Null Hypothesis is rejected
RECESSION	HANG SENG	.970129	2.38390512	Null Hypothesis is accepted
2011-13	NIFTY 50	.526205	2.22599726	Null Hypothesis is accepted
	S & P 500	2.680176	2.38393387	Null Hypothesis is rejected

Table 9.1 Weekend effect

When F calculated > F Tabulated then the Null Hypothesis is rejected. It means that the return obtained on each of the days is not equal.



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So the Weekend effect was observed in FTSE index before recession, Nifty 50 during recession and FTSE and S&P indices post recession.

TURN OF THE MONTH EFFECT

Null Hypothesis:

H0=ReturnDay 1 = ReturnDay 2 = ReturnDay 3 ==ReturnDay 30 = ReturnDay 31

Alternate Hypothesis:

H1=ReturnDay 1 ≠ ReturnDay 2 ≠ ReturnDay 3 ≠..... ≠ReturnDay 30 ≠ ReturnDay 31

Study Period	INDEX	F calculated	F Tabulated	HYPOTHESIS RESULT
PRE	FTSE 100	14.3449	1.80154318	Null Hypothesis is rejected
RECESSION	HANG SENG	2.983558	1.47419849	Null Hypothesis is rejected
2005-07	NIFTY 50	3.328464	1.47466841	Null Hypothesis is rejected
	S & P 500	3.933299	1.47458459	Null Hypothesis is rejected
RECESSION	FTSE 100	1.8456	1.47496904	Null Hypothesis is rejected
2008-10	HANG SENG	3.836287	1.47458459	Null Hypothesis is rejected
	NIFTY 50	2.5248	1.47486035	Null Hypothesis is rejected
	S&P 500	3.713316	1.47437895	Null Hypothesis is rejected
POST	FTSE 100	2.838023	1.47394522	Null Hypothesis is rejected
RECESSION	HANG SENG	2.970122	1.47456378	Null Hypothesis is rejected
2011-13	NIFTY 50	3.259239	1.47435869	Null Hypothesis is rejected
	S & P 500	1.68298	1.47458459	Null Hypothesis is rejected

Table 9.2 Turn Of the Month Effect

The Null Hypothesis is rejected in all the periods in all the indices. It signifies that the Turn of the Month Effect could be observed at all the stock markets. The turn-of-the-month effect refers to the tendency of stock prices to rise on the last four trading day of the month and the first three trading days of the next month. This effect can be ascribed to the timing of monthly cash flows received by pension funds and reinvested in the stock market. End of the month is also a natural point for portfolio/trading models rebalancing between retail and professional investors and this also could help this effect to become statistically significant.

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TURN OF THE YEAR EFFECT

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Null Hypothesis:

H0=ReturnJanuary = ReturnFebuary = ReturnMarch =....=ReturnNovember = ReturnDecember

Alternate Hypothesis:

H1=ReturnJanuary ≠ ReturnFebuary ≠ ReturnMarch ≠...... ≠ReturnNovember ≠ ReturnDecember

Study Period	INDEX	F calculated	F Tabulated	HYPOTHESIS RESULT
PRE	FTSE 100	.029287	1.80071224	Null Hypothesis is accepted
RECESSION	HANG SENG	.673938	1.80100898	Null Hypothesis is accepted
2005-07	NIFTY 50	0005	1.80140535	Null Hypothesis is accepted
	S & P 500	2.14161	1.80074530	Null Hypothesis is rejected
RECESSION	FTSE 100	.738537	1.86086662	Null Hypothesis is accepted
2008-10	HANG SENG	4.968739	1.80089797	Null Hypothesis is rejected
	NIFTY 50	1.420094	1.80115470	Null Hypothesis is accepted
	S&P 500	.943342	1.80080440	Null Hypothesis is accepted
POST	FTSE 100	.529178	1.80149115	Null Hypothesis is accepted
RECESSION	HANG SENG	1.088915	1.80152579	Null Hypothesis is accepted
2011-13	NIFTY 50	.948416	1.80128714	Null Hypothesis is accepted
	S & P 500	.697862	1.80154318	Null Hypothesis is accepted

Figure 9.3 Turn of the Year Effect

The Null Hypothesis is accepted in all cases except two. The Hypothesis has been rejected in the indices of S&P and Hang Seng. The period in which the Hypothesis has been rejected is before the recession and during the recession period. Hence, before the recession which has taken place in the period of 2008-10 the existence of the January Effect was evident in the US Market.

SEMI MONTH EFFECT

Null Hypothesis:

H₀: Returns during the first half of the month are higher than the returns obtained during



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the other half of the month

Alternate Hypothesis:

Ha: Returns during the first half of the month are not higher than the returns obtained during the other half of the month.

Study Period	INDEX	T calculated	T Tabulated	HYPOTHESIS RESULT
PRE	FTSE 100	.001779	1.96311519	Null Hypothesis is accepted
RECESSION	HANG SENG	.002115	1.96308615	Null Hypothesis is accepted
2005-07	NIFTY 50	00199	1.96314050	Null Hypothesis is accepted
	S & P 500	1.97063	1.96312358	Null Hypothesis is rejected
RECESSION	FTSE 100	2.20099	1.96310268	Null Hypothesis is rejected
2008-10	HANG SENG	2.00711	1.96311101	Null Hypothesis is rejected
	NIFTY 50	.000573	1.96317925	Null Hypothesis is accepted
	S&P 500	00033	1.96311101	Null Hypothesis is accepted
POST	FTSE 100	.006754	1.963111519	Null Hypothesis is accepted
RECESSION	HANG SENG	.00379	1.96311938	Null Hypothesis is accepted
2011-13	NIFTY 50	.002974	1.96307796	Null Hypothesis is accepted
	S & P 500	.001269	1.96312358	Null Hypothesis is accepted

Table 9.4Semi Month Effect

The above analysis shows that the presence of the Semi Monthly Effect was found to be present in all the above mentioned cases except in three cases. During the time of recession there was a reverse Semi Month Effect that could be observed in the FTSE and Hang Seng Indices. Prior to the occurrence of recession there was a reverse of Semi Month Effect observed in the S&P Index of USA. Probably this was an indicator of the decline of the markets in the days to come.

CONCLUSION:

From the study of anomalies it can be concluded that investor can beat the market, and can generate abnormal returns by taking advantage of market anomalies. This study examined the seasonal anomalies for FTSE 100, HKNG, S&P 500, NIFTY 50. The study used the logarithmic data for selected sample indices.

The seasonality analysis indicates that the presence of WEEKEND effect could be seen in Hang Seng Index during all the three periods. JANUARY EFFECT was observed during pre



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and post recession. This effect was absent during the period of recession. TURN OF THE MONTH EFFECT could be observed during all the periods in all the indices under the study. SEMI MONTH EFFECT could be observed in pre recession times in all indices except in S&P 500 and during post recession. During recession this effect could not be seen in FTSE 100 and HANG SENG index.

The findings violate the basic premises of the efficient market hypothesis in its weak-form and this phenomenon could be considered as a superior opportunity for the investors to earn reasonable returns from the market.

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