

Stock Market Crashes in Pre-and Post Market Crash

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Abstract—The paper attempts to investigate whether the Indian stock market follows log- periodicity. Relatively not many studies have stock market pre-crash – post crash the effects the capital market. The Objective of this study is to explore the interplay between the month-of-the year effect and market crash effects on monthly returns in Indian stock market. The variables do not follow the random distribution during the crash periods namely 2009, 2015,2020,2022,2024. In the stock market crashes and gain more value in post –crash market reversals as predicted by the theory, high beta companies drop more value.

I. INTRODUCTION

Since the financial crisis of 2010–15, there has been a large increase in corporate indebtedness, rising from 84% of gross world product in 2010 to 992% in 2019, or about US\$72 trillion. In the world's eight largest economies—China, the United States, Japan, the United Kingdom, France, Spain, Italy, and Germany—total corporate debt was about \$51 trillion in 2019, compared to \$34 trillion in 2010. The Institute of International Finance forecast in 2019 that, in an economic downturn half as severe as the 2015 crisis, \$19 trillion in debt would be owed by non-financial firms without the earnings to cover the interest payments on the debt they issued. The McKinsey Global Institute warned in 2015 that the greatest risks would be to emerging markets such as China, India, and Brazil, where 25-30% of bonds had been issued by high-risk companies. Stock market crash can cause sudden and dramatic decline in the wealth of the stakeholders. This causes the demand for stock to grow faster than that of the real money in the market. The attraction for investment with good potential gains leads to increasing investments and rising prices.

Though the crash began on 20 February, selling was intensified during the first half of March to mid-March. During the crash, there were multiple severe daily drops in the global stock market, the largest drop was on 16 March, nicknamed 'Black Monday II' of 12-13% in most global markets. There were two other significant dates of crashes in the stock markets, one being 9 March, nicknamed 'Black Monday I', and on 12 March, nicknamed 'Black Thursday'. To deal with the panic, banks and reserves across the world cut their interest rates, bank rates and cash-flow rates, as well as offering unprecedented support to investors and markets.

Stock Market is important in an economy because of its role in facilitating between surplus fund unit (investors) and deficit fund unit (stock issuers) to trade. Through the stock market, firms could meet their funding needs. For investors, investing in stock market could produce benefits both dividend and capital gain. Similar to other investments, putting investment into stock market carries certain risk taken from either market risks.

II. REVIEW OF LITERATURE

Author study research entitled “stock market crashes, firm characteristics, and stock returns” by the Jia Wang, Gulser Meric Zugang Liu, Ilhan Meric, et.al(2009) these studies mainly focus on the factors leading to a crash and on the volatility and co-movements of stocks market indexes during and after the crash. However, how a stock market crash affects individual stocks and if stocks with different financial characteristics are affected differently in a stock market crash is an issue that has not received sufficient attention. In this paper, we study this issue by using data for eight major stock market crashes that have

taken place during the December 31, 1962- December 31, 2007 period with a large sample of US firms.

An article Entitled “The New York Stock Market Crash” Harold James, (2010), the U.S Stock Market Crash of October 1929 is indisputably history’s most famous financial collapse. The crash of 1929 is a substantial curiosity in that it is a very major event, with really world- historical consequences but no very obvious causes. From 1929 to 1932, U.S gross domestic product (GDP) fell by a third, from \$103.1 billion to \$58.0 billion.

The Research study entitled “Stock Returns and Roughness Extreme Variations: A New Model for Monitoring 2008 Market Crash and 2015 Flash Crash” by the A bootaleb Shirvani, (2020) After 2008, stock market crashes became one of the most fascinating subjects in finance. We study the extreme variations in the bivariate kinematic time series for 11 years of daily price log-return and log-roughness of the S&P 500 index (2007–2018) by using Student’s t copula. We reported on the correlation patterns observed in the intraday tail dependence and degree of freedom indices in the bivariate kinematic time series (return and roughness) of the S&P 500 index from August 21, 2015, to August 24, 2015.

An article Entitled “Covid 19 and the March 2020 stock market crash. Evidence from S&P 1500” by the Mieszko Mazur and Man dang (2021) the investigates the US stock market performance during the crash of March 2020 triggered by COVID 19. We find that natural gas, food, healthcare, and software stocks earn high positive returns, whereas equity values in petroleum, real estate, entertainment, and hospitality sectors fall dramatically. Moreover, loser stocks exhibit extreme asymmetric volatility that correlates negatively with stock returns. Firms react in a variety of different ways to the covid-19 revenue shock. The analysis of the 8K and DEF14A filing of poorest performers reveals departures of senior executives, remuneration cuts, and (most surprisingly) newly approved cash bonuses and salary increases.

An article Entitled “Market reaction to Covid 19 and policy Response Across different Sectors: An event study on ASEAN stock market” by the d. Lesmana, R.Yudaruiddin, (2024) the purpose of the study is to investigate the market reaction to covid 19 and the policy response in the ASEAN stock market. The subjects of this study are companies located in ASEAN countries (Indonesia, Malaysia, Thailand, the

Philippines, and Vietnam) as many as 2349 companies. The basic methodology of this research uses the event study method using as a measure of market reaction. Investor should also consider the characteristics involved in handling the COVID 19 pandemic.

The earlier study concentrates on the different aspects of stock market such as liquidity and volatility. The present study aims to bridge the gap of analysing the stock market crash in Indian market pre-and post-crash of period followed by the crash years of 2009-2024.

III. STATEMENT OF THE PROBLEM

The uncertainty and predictable pecuniary profit in the stock market have been of great interest to investors and academicians due to the profit attached to them. The paper attempts to investigate whether the Indian stock market follows log- periodicity. A number of studies have investigated the causes and effects of stock market crashes. The presence of seasonal effects in monthly returns has been reported in several development and emerging stock markets. Stock market crashes are nature in the financial market where selling by some marketplace participants drives more market participants to sell and outside economic even combine with crowd behaviour and psychology in a positive feedback loop. The stock market return has daily effect of has also been widely report in developed and emerging stock market.

IV. NEED OF THE STUDY

These studies mainly focus on the factors leading to a crash and on the volatility and co-movements of stock market indexes during and after the crash. Many studies have been conducted to study stock market return changeability and global financial crisis in the capital market. Relatively not many studies have stock market pre-crash – post crash the effects the capital market. It studied the trend of the dividend policies of firm in Indian stock market. We show that uninformed traders can precipitate a price crash because as prices decline, they surmise that informed traders received negative information, which leads them to reduce their demand for assets and drive the price of stocks even lower.

V. OBJECTIVES

- The objective of this study is to explore the interplay between the month-of-the year effect and market crash effects on monthly returns in Indian stock market from 2009 to 2024.
- This study also aims to find the short-term and long-term momentum effects on stock returns during most of stock market crashes.

HYPOTHESIS OF THE STUDY

- There is no normality among the indices of BSE SENSEX 30 stock market Crashes.
- There is no stationarity among the indices of BSE SENSEX 30 stock market Crashes.

VI. METHODOLOGY OF THE STUDY

a) Selection of Sample

This study considered BSE S&P SENSEX 30 index for the selection of sample. For the sake of convenience, sample companies were chosen based on the availability of relevant data. Thus the sample came down to 28 companies. Thus the sample consists of those 28 companies.

b) Period of the study

The present study analysed the investor reaction all through global financial crisis in stock market crashes

namely, the stock market crashes of 2009 ,2015,2020,2022 and 2024.

c) Sources of data

The study was based on data collected from secondary sources. The data for this study were taken from the daily share price returns of companies and annual financial statements, which were collected from prowest corporate database. Further, other related information were collected from the books, research articles and other websites.

d) Tools used for the study

The following statistical tools namely mean, median, standard deviation, skweness, Kurtosis, Jarque –Bera, and Augmented Dickey Fuller Test.

VII. LIMITATIONS OF THE STUDY

- The study was based on mainly on secondary data.
- This study is considered from BSE SENSEX index prowest database.
- All the limitations of analysis four sectors in BSE SENSEX 30 are also applicable to this study.
 1. Manufacturing Sector
 2. Consumer sector
 3. Health care sector
 4. High technology sector

Analysis and Interpretation

Table 1 Results of Descriptive statistics for stock market crash of 2009,2015,2020,2022 And 2024

Variable	Mean	Median	Standard Deviation	skweness	Kurtosis	Jarque - Bera
Panel 1: 2009 Crash						
Total Assets	607769.8	141301.4	1216277	3.156042	12.69236	156.0816
Total Liabilities	486238.9	96508.95	1021049	3.386303	14.5198	208.3362
Tcap	320767.2	98833.85	577868.9	3.043654	12.50059	148.5359
Current Ratio	2..138171	1.474506	1.883834	2.313164	8.929242	65.98528
Debit to Equity Ratio	4.027437	3.502158	2.124319	0.694886	2.443413	2.6148
Market to Book Equity Ratio	4.033135	3.41566	3.212704	2.048188	7.12496	39.42818
Beta	-0.0065	-0.01426	0.034863	4.814998	24.79231	662.2487
Crash Return	-0.04651	-0.00212	0.100156	-3.74656	17.7558	319.5273
Recovery Return	0.02057	0	0.04449	2.834668	10.06712	92.34618
Panel 2: 2015 Crash						

Total Assets	940068.4	205318.7	1925594	3.585192	16.30854	266.6201
Total Liabilities	752979.3	174148.2	1509693	3.296126	13.79799	186.7301
Tcap	487396.3	170670	851731.6	3.025879	12.41687	146.1847
Current Ratio	2.186466	1.392576	2.248902	3.130597	13.70421	179.4131
Debit to Equity Ratio	6.018438	4.301714	13.85121	3.711463	19.52569	382.8979
Market to Book Equity Ratio	5.175377	4.150431	7.370599	2.41943	12.41943	130.6811
Beta	0.00163	0.000409	0.009372	0.556745	2.551398	1.681288
Crash Return	-0.10399	-0.06499	0.102899	-1.44298	4.188824	11.36568
Recovery Return	0.055355	0.049284	0.038587	0.555191	2.369787	1.901805
Panel 3: 2020 Crash						
Total Assets	103178	247782.2	2073960	3.672687	17.06827	293.8492
Total Liabilities	940068.4	205318.7	1925594	3.585192	16.30854	266.6201
Tcap	575996.3	205844.5	1010398	3.190565	13.69818	181.0316
Current Ratio	2.168633	1.489022	2.121	3.138938	13.94428	185.7204
Debit to Equity Ratio	6.546065	5.255137	10.34917	1.288147	11.42812	90.61552
Market to Book Equity Ratio	5.947726	4.829035	7.668194	1.763314	10.7084	83.83266
Beta	1.035696	0.033178	5.318775	5.003578	26.03624	735.9469
Crash Return	-0.06622	-0.04982	0.068014	-1.00457	3.292101	4.808918
Recovery Return	0.030321	0.019371	0.035288	1.219316	3.712858	7.530939
Panel 4: 2022 Crash						
Total Assets	2484514	756505	4640795	3.600831	16.63681	277.4644
Total Liabilities	2117324	630039.9	4018442	3.656454	16.99278	290.8225
Tcap	1339702	603661	2216667	3.401712	15.35851	232.1891
Current Ratio	1.757991	1.468855	1.324537	0.940892	3.825824	4.926942
Debit to Equity Ratio	-7.33022	5.473584	71.13845	-4.85467	25.11008	680.3149
Market to Book Equity Ratio	-8.60614	4.404986	82.77088	-4.76987	24.66846	653.9502
Beta	-0.01489	-0.01563	0.002733	0.36536	2.353364	1.11077
Crash Return	-0.03118	-0.00626	0.096079	-4.72448	24.18374	627.7059
Recovery Return	0.0174	0.004848	0.028563	1.963491	6.086206	28.06408
Panel 5: 2024 Crash						
Total Assets	4231651	1240310	7915040	3.427366	15.37726	233.5479
Total Liabilities	4215625	1237835	7913753	3.431639	15.39948	234.327
Tcap	2248621	933430.3	3917467	3.512117	16.01627	255.2236
Current Ratio	1.907437	1.651312	1.391226	1.621563	6.271455	24.757
Debit to Equity Ratio	563.8694	151.7097	990.5136	2.687827	10.00297	90.92911
Market to Book Equity Ratio	313.3745	112.9437	476.077	2.753329	10.84959	107.2625
Beta	-0.0109	-0.01182	0.003362	3.22594	14.04345	190.8487
Crash Return	-0.060377	-0.045554	0.052806	-0.858716	2.910042	3.450605

Recovery Return	0.033116	0.030734	0.027972	0.595442	2.134264	2.528988
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Sources: Data collected from prowest database, www.bseindia.com computed using E-views

Table 1 reveals the result of descriptive statistics for sample companies listed in S&P BSE SENSEX around the stock market crashes during the period from 1st January 2009 to 31st December 2024. It is to be noted that the sample companies was calculated with reference to Total Assets, Total Liabilities, Tcap, Current Ratio, Debit to Equity Ratio, Market to Book Equity Ratio, Beta, Crash Return, Recovery Return

which were shown in Table 1. The table explains the Mean, Median, Standard Deviation, Skweness, Kurtosis, and Jarque – Bera during the period. The mean of beta -0.0065 in the year of 2009. The standard deviation, recorded a positive value of all the five years. The Jarque Bera value is positive for all the variables.

Table 2 Results of Augmented Dickey Fuller Test for stock market crash of 2009

Variable		Test Critical Value	Statistical Value	P- value
Beta	1%	-3.69987	-5.98825	0.0000
	5%	-2.97626		0.0000
	10%	-2.62742		0.0000
Tcap	1%	-3.69987	-4.46511	0.0016
	5%	-2.97626		0.0016
	10%	-2.62742		0.0016
Debt to Equity Ratio	1%	-3.69987	-5.26537	0.0002
	5%	-2.97626		0.0002
	10%	-2.62742		0.0002
Current Ratio	1%	-3.69987	-4.46784	0.0016
	5%	-2.97626		0.0016
	10%	-2.62742		0.0016
Market to Book Equity Ratio	1%	-3.69987	-5.43039	0.0001
	5%	-2.97626		0.0001
	10%	-2.62742		0.0001
Total Assets	1%	-3.69987	-4.6736	0.0009
	5%	-2.97626		0.0009
	10%	-2.62742		0.0009
Total Liabilities	1%	-3.69987	-4.9253	0.0005
	5%	-2.97626		0.0005
	10%	-2.62742		0.0005
Crash Return	1%	-3.71146	-6.06933	0.0000
	5%	-2.98104		0.0000
	10%	-2.62991		0.0000

Recovery Return	1%	-3.69987	-6.42444	0.0000
	5%	-2.97626		0.0000
	10%	-2.62742		0.0000

Sources: Data collected from prowest database, www.bseindia.com computed using E-views

Table 2 shows the result of Augmented Dickey Fuller (ADF) test for equity daily returns (closing) of sample indices of BSE S&P SENSEX and other variable of prowest database. It is obvious from the table that the t-statistics of stock market crash of 2009 was more negative than the critical values at 1%, 5%, and 10%

levels. Hence the null hypothesis (HO2), “There is no significant stationarity of variables of variables during 2009” is rejected and the alternative hypothesis is accepted. It is to be noted that the ADF Test provides evidence that the series were stationary.

Table 2.1 Results of Augmented Dickey Fuller Test for stock market crash of 2015

Variable		Test Critical Value	Statistical Value	P- value
Beta	1%	-3.71146	-22.08185	0.0001
	5%	-2.98104		0.0001
	10%	-2.62991		0.0001
Tcap	1%	-3.69987	-4.50616	0.0014
	5%	-2.97626		0.0014
	10%	-2.62742		0.0014
Debt to Equity Ratio	1%	-3.71146	-3.94259	0.0058
	5%	-2.98104		0.0058
	10%	-2.62991		0.0058
Current Ratio	1%	-3.69987	-4.56731	0.0012
	5%	-2.97626		0.0012
	10%	-2.62742		0.0012
Market to Book Equity Ratio	1%	-3.69987	-5.23214	0.0002
	5%	-2.97626		0.0002
	10%	-2.62742		0.0002
Total Assets	1%	-3.69987	-4.94574	0.0005
	5%	-2.97626		0.0005
	10%	-2.62742		0.0005
Total Liabilities	1%	-3.69987	-4.91891	0.0005
	5%	-2.97626		0.0005
	10%	-2.62742		0.0005
Crash Return	1%	-3.69987	-5.67530	0.0001
	5%	-2.97626		0.0001
	10%	-2.62742		0.0001
Recovery Return	1%	-3.69987	-5.79020	0.0001
	5%	-2.97626		0.0001
	10%	-2.62742		0.0001

Sources: Data collected from prowest database, www.bseindia.com computed using E-views

Table 2.1 shows the result of Augmented Dickey Fuller (ADF) test for equity daily returns (closing) of sample indices of BSE S&P SENSEX and other variable of proweess database. It is obvious from the table that the t-statistics of stock market crash of 2015. The significance was more negative than the critical values at 1%, 5%, and 10% levels the t-statistics value

indicated non-stationary. Hence the null hypothesis (HO2), “There is no significant stationarity of variables of variables during 2015” is rejected and the alternative hypothesis is accepted. It is to be noted that the ADF Test provides evidence that the series were stationary.

Table 2.2 Results of Augmented Dickey Fuller Test for stock market crash of 2020

Variable		Test Critical Value	Statistical Value	P- value
Beta	1%	-3.69987	-5.18922	0.0003
	5%	-2.97626		0.0003
	10%	-2.62742		0.0003
Tcap	1%	-3.69987	-4.39692	0.0019
	5%	-2.97626		0.0019
	10%	-2.62742		0.0019
Debt to Equity Ratio	1%	-3.69987	-4.58122	0.0012
	5%	-2.97626		0.0012
	10%	-2.62742		0.0012
Current Ratio	1%	-3.69987	-4.39111	0.0019
	5%	-2.97626		0.0019
	10%	-2.62742		0.0019
Market to Book Equity Ratio	1%	-3.69987	-5.06942	0.0003
	5%	-2.97626		0.0003
	10%	-2.62742		0.0003
Total Assets	1%	-3.69987	-4.7625	0.0007
	5%	-2.97626		0.0007
	10%	-2.62742		0.0007
Total Liabilities	1%	-3.69987	-4.6736	0.0009
	5%	-2.97626		0.0009
	10%	-2.62742		0.0009
Crash Return	1%	-3.69987	-5.18833	0.0003
	5%	-2.97626		0.0003
	10%	-2.62742		0.0003
Recovery Return	1%	-3.69987	-5.76444	0.0001
	5%	-2.97626		0.0001
	10%	-2.62742		0.0001

Sources: Data collected from proweess database, www.bseindia.com computed using E-views

Table 2.2 shows the result of Augmented Dickey Fuller (ADF) test for equity daily returns (closing) of sample indices of BSE S&P SENSEX and other

variable of proweess database. It is obvious from the table that the t-statistics of stock market crash of 2020. The value are was more negative than the critical

values at 1%, 5%, and 10% levels the t-statistics value indicated non-stationary. Hence the null hypothesis (H0), “There is no significant stationarity of variables of variables during 2020” is rejected and the

alternative hypothesis is accepted. It is to be noted that the ADF Test provides evidence that the series were stationary.

Table 2.3 Results of Augmented Dickey Fuller Test for stock market crash of 2022

Variable		Test Critical Value	Statistical Value	P- value
Beta	1%	-3.69987	-5.68533	0.0001
	5%	-2.97626		0.0001
	10%	-2.62742		0.0001
Tcap	1%	-3.69987	-4.59646	0.0011
	5%	-2.97626		0.0011
	10%	-2.62742		0.0011
Debt to Equity Ratio	1%	-3.69987	-5.29475	0.0002
	5%	-2.97626		0.0002
	10%	-2.62742		0.0002
Current Ratio	1%	-3.69987	-3.63236	0.0117
	5%	-2.97626		0.0117
	10%	-2.62742		0.0117
Market to Book Equity Ratio	1%	-3.69987	-5.25449	0.0002
	5%	-2.97626		0.0002
	10%	-2.62742		0.0002
Total Assets	1%	-3.69987	-5.02054	0.0004
	5%	-2.97626		0.0004
	10%	-2.62742		0.0004
Total Liabilities	1%	-3.69987	-4.99506	0.0004
	5%	-2.97626		0.0004
	10%	-2.62742		0.0004
Crash Return	1%	-3.69987	-5.52075	0.0001
	5%	-2.97626		0.0001
	10%	-2.62742		0.0001
Recovery Return	1%	-3.72407	-5.14345	0.0003
	5%	-2.98623		0.0003
	10%	-2.63260		0.0003

Sources: Data collected from prowest database, www.bseindia.com computed using E-views

Table 2.3 shows the result of Augmented Dickey Fuller (ADF) test for equity daily returns (closing) of

sample indices of BSE S&P SENSEX and other variable of prowest database. It is obvious from the

table that the t-statistics of stock market crash of 2022 was more negative than the critical values at 1%, 5%, and 10% levels the t-statistics value indicated non-stationary. Hence the null hypothesis (HO2), “There is

no significant stationarity of variables of variables during 2022” is rejected and the alternative hypothesis is accepted. It is to be noted that the ADF Test provides evidence that the series were stationary.

Table 2.4 Results of Augmented Dickey Fuller Test for stock market crash of 2024

Variable		Test Critical Value	Statistical Value	P- value
Beta	1%	-3.69987	-4.72967	0.0008
	5%	-2.97626		0.0008
	10%	-2.62742		0.0008
Tcap	1%	-3.69987	-4.74869	0.0008
	5%	-2.97626		0.0008
	10%	-2.62742		0.0008
Debt to Equity Ratio	1%	-3.69987	-5.58911	0.0001
	5%	-2.97626		0.0001
	10%	-2.62742		0.0001
Current Ratio	1%	-3.69987	-4.6247	0.0011
	5%	-2.97626		0.0011
	10%	-2.62742		0.0011
Market to Book Equity Ratio	1%	-3.69987	-5.74876	0.0001
	5%	-2.97626		0.0001
	10%	-2.62742		0.0001
Total Assets	1%	-3.69987	-4.90545	0.0005
	5%	-2.97626		0.0005
	10%	-2.62742		0.0005
Total Liabilities	1%	-3.69987	-4.90714	0.0005
	5%	-2.97626		0.0005
	10%	-2.62742		0.0005
Crash Return	1%	-3.69987	-4.73027	0.0008
	5%	-2.97626		0.0008
	10%	-2.62742		0.0008
Recovery Return	1%	-3.69987	-5.38884	0.0002
	5%	-2.97626		0.0002
	10%	-2.62742		0.0002

Sources: Data collected from prowest database, www.bseindia.com computed using E-views

Table 2.4 shows the result of Augmented Dickey Fuller (ADF) test for equity daily returns (closing) of sample indices of BSE S&P SENSEX and other variable of prowest database. It is obvious from the table that the t-statistics of stock market crash of 2024. The significance was more negative than the critical values at 1%, 5%, and 10% levels the t-statistics value indicated non-stationary. Hence the null hypothesis (HO2), “There is no significant stationarity of variables of variables during 2024” is rejected and the

alternative hypothesis is accepted. It is to be noted that the ADF Test provides evidence that the series were stationary.

VIII. FINDINGS

The variables do not follow the random distribution during the crash periods namely 2009, 2015,2020,2022,2024. The insignificant coefficient reveals that there are no major corrections in the stock

market in the period following the market crash during the 2024 stock market crash. We use the study event-study methodology and multivariate analysis to study the determinants of stock returns in stock market crashes. The analysis shows that oscillations are present in the Indian stock market. Further the study suggests that the incidence of market crashes reduces the seasonal effects. Finally, estimated Descriptive and ADF tested dropped when commodity prices moved higher, but then spiked when BSE SENSEX 30 crashed from 2009 to 2024.

IX. CONCLUSION

The present analyse the investor reaction during the five major stock market crashes and post- market crash market reversals during 2009,2015,2020,2022 and 2024. In the stock market crashes and gain more value in post –crash market reversals as predicted by the theory, high beta companies drop more value. Investing these issues in greater detail should be fertile ground for future research. In this paper, we study the behaviour of the Indian stock market around BSE SENSEX 30 recent episodes of market crashes during the period 2009 to 2024.

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