EFFECT OF UNION BUDGET PRESENTATION ON INDIAN STOCK MARKET

Dr. Ruchika Gahlot[*]

Abstract

This research paper tries to analyze the effect of budget presentation on stock market volatility for which the whole time period is divided into short term (3 days prior and 3 days post budget) medium term (15 days prior and 15 days post budget) and long term (60 days in which dummy variable was introduced). This study used closing prices of the four major indices of these exchanges to represent Indian stock market i.e. CNX Nifty, CNX Nifty Junior, S&P BSE Sensex and S&P BSE 100.This paper is based on 6 budgets presented in parliament from 2010 to 2015. Paired t test is applied for checking short term and medium term effect while C GARCH M test is applied for long term. The results revealed that budget don't have significant effect on stock market in short term. The results for medium term shows that budget have significant effect on medium term volatility of stock market for 2010, 2011, 2012, 2013 and 2014.This implies that stock market takes time to absorb the effect of budget announcement and get depicted in its prices within 15 days' time period. The results for long term volatility also reveals that budget have no significant effect on stock market in long term.

Keywords: Budget, Stock Market, Volatility, C GARCH M, t Test

JEL Categories: C22, E44, G10, H61, H70.

[*] **Assistant Professor,Department of Management,Maharaja Surajmal Institute (Affiliated to GGSIPU)**

1. Introduction

Volatility is one of the best phenomenon without which stock markets will lose its charms. The volatility of the stock market is the tendency of the market fluctuation, which is indicated through it's the indices over a period of time. The higher the indices, the higher are the volatility. In fact, it is the ups and downs of the stock prices which add spice to the market behavior. The ups and downs of the stock market add spice to the market behavior.

The volatility of the market has its own implications as prudent investors can take advantage of buying on dips and sell on highs for profit booking. The disadvantage is that the greater volatility lowers the confidence of the investor in the market which prompt them to transfer their investment in less risky options due to unexpected market behavior.

Certain factors are held responsible for changes in stock prices. In some studies, micro economic variable like Dividend per share, earning per share, company size, book value per share have got importance and in others, macroeconomic variables like index of industrial production, bank rate of interest, union budget, inflation rate and foreign currency have been highlighted. Hence annual budget is one of the important events which should be considered for studying volatility of stock market.

In India, the budget is an annual financial statement containing the estimated receipt and expenditure of the Government of India, which has to be laid before parliament in respect of every financial year, which runs from 1st April to 31st March under article 112 of the constitution. A budget is a powerful tool in the hands of the Government to control the economic resources of the country. It contains the proposal regarding changes in tax policy, industrial policy, trade policy, exchange rate policy and financial sector reforms which may have favorable or adverse impact on stock market.

Objectives of the study: Following are the objectives of the study:

- To check the effect of budget presentation on short term, medium term and long term volatility of stock market.
- To establish relation between political party in power and rate of volatility.

• To decompose conditional variances into a long run time varying trend component and a short run transitory component, which reverts to the trend following a shock by using CGARCH M model.

2. Literature review

Varadharajan and Vikkraman (2011) have investigated the impact of budget on stock market volatility. They have also analyzed the volatility of different months for 10 years (2002-2011) by using four indices of NSE and BSE. It is found that return of the indices after the budget was negative as compared to pre budget and volatility had increased during post budget period.

Thomas and Shah (2002) analyzed the interplay between the Budget and the stock market, in relation to Informational efficiency. They examine the extent to which the stock market response to the Union Budget. They concluded that the stock market appears to be fairly efficient at information processing about the Union Budget.

Gupta and Kundu (2006) analyzed the impact of Union Budgets on Indian stock prices of BSE, Bombay Stock Exchange. The impact was observed in terms of returns and volatility during the period of 15 years from 1991 to 2005. They have applied some statistical tests on returns around the time of budget over the years. They concluded that budget exerts the maximum impact, in terms of absolute return immediately on and around the budget day, which gradually gets concentrated as one moves further away from the budget day. This means that budgets have maximum impact in shortterm post-budget period, as compared to medium term and long term average return. Volatility does not generally increase in a post-budget situation as the time period increases

Soni (2009) studied the response of stock market in relation to union budget and time to time monetary policy announcements. He considered the time period covered of 10 years i.e. from the year 2000-2009. He has applied paired ttest among different periods during announcements days and F-tests to compare the last 30 days' returns with next three fifteen and thirty days. The results show that the union budget and monetary policy announcements have no impact on the

stock market in the long run. However, in the short run impact may be either way i.e. positive as well as negative.

Singh and Kansal (2010) examined the impact of Union Budget on stock market of India by considering S & P CNX Nifty from the time period 1996 to 2009. They segregated the time period into short term, medium term and long term periods. The results concluded that the budget have maximum impact on market trend in short term rather than in medium and long period. They have applied paired t-test and F-test to compare the average return and variance in return respectively over different period around the budget. They found that with regard to the return an investor has the chance to earn super-profits by investing during the short-term and medium-term periods around the budget. They also concluded that the volatility does not increase in the post budget situation as the time period increases.

Babu and Venkateswarlu (2013) examined the impact of Union Budgets on Indian stock prices, as represented by Sensex, the premier index of BSE (Bombay Stock Exchange). They calculated the impact in terms of returns and volatility over nineteen-year period from 1991 to 2009. They have applied the statistical tests on returns around the time of budget and three, fifteen and thirty days' average returns around the budget. The results concluded that over the years, a budget exerts the maximum impact in terms of absolute return immediately on and around the budget day which gradually gets reduced as one moves further away from the budget day.

Verma and aggarwal (2005) studied the volatility of CNX Nifty for four years using budget as an event window by comparing pre and post budget returns. The results revealed that event has significant impact on the stock market.

Rao(1997) examined the impact of macroeconomic events like union budget and the credit policy announcements on stock prices from 1991-1995. He found that budgets increased the volatility of stock prices of market portfolio. However, the credit policy announcement was found to have no impact on stock price behavior.

Khana and Gogia (2014) explored the stock market behavior on pre and post announcements of Government budget (India: Union budget, US: Federal budget and UK: Government budget) covering the period of 2008-2009 to 2010-2011. The study revealed that in India, the union budget mainly affects the stock market in short term mainly and medium term also. But in long term those budgets have not any significant impact on stock market. In USA, the budget mainly affects the stock market in long term and medium term. The main reason of this type of impact was that the budget process takes much time in USA. After the decision and approval of Congress, budget proposals came into effect for the next year. In UK, budget mainly affects the stock market in short term mainly and medium term also. But in long term those budgets have not any significant impact on stock market trend.

Singhvi (2014) examined the effect of union budget on Nifty by taking time period of 1996 to 2013. She had divided the time period into short term (3 days), medium term (15 days), long term (30 days) before and after the declaration of union budget. It was found that union budget has no significant effect on Nifty.

Research gap: The paper is primarily motivated by several reasons. Firstly, no researchers have used CGARCH M model for measuring long term volatility which is superior to other models. Secondly, majority of studies are conducted by using one or two indices i.e. Nifty and Sensex. Thirdly, only few studies are conducted to check short term, medium term and long term volatility.

3. Research methodology:

The research methodology of paper is divided into two parts:

3.1. Data Collection: This study is based on the secondary source of data collection. Since National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) are the two major stock exchange of India, I employed closing prices of the four major indices of these exchanges to represent Indian stock market i.e. CNX Nifty, CNX Nifty Junior, S&P BSE Sensex and S&P BSE 100. This study is based on 6 budgets presented in parliament from 2010 to 2015. The trading days used for the study are divided into three parts:

a)   Short term volatility: For this purpose, 3 days prior and 3 days post budget prices are considered.

b)   Medium term volatility: For studying medium term volatility, 15 days prior and 15 days post budget prices are considered.

c)   Long term volatility: It is checked by taking closing prices of 60 days in which dummy variable was introduced (dummy variable was zero before announcement of budget and 1 after budget announcement.

Table 3.1.Represents the date of budget, and presenter and political party in power.

Table 3.1: Event dates and period of study

S.No.	Year	Date of Budget presentation	Presenter	Period of data	
1.	2010	26 Feb 2010	Pranab Mukherjee	1st sep 2009 to 31st Aug 2010	Indian National Congress
2.	2011	28 Feb 2011	Pranab Mukherjee	1st sep 2010 to 31st Aug 2011	Indian National Congress
3.	2012	16 Mar. 2012	Pranab Mukherjee	1st sep 2011 to 31st Aug 2012	Indian National Congress
4.	2013	28 Feb 2013	P. Chidambaram	1st sep 2012 to 31st Aug 2013	Indian National Congress
5.	2014	10 Jul 2014	Arun Jaitley	1st Jan. 2014 to 31st Dec 2014	Bharatiya Janata Party
6.	2015	28 Feb 2015	Arun Jaitley	1st sep 2014 to 31st Aug 2015	Bharatiya Janata Party

3.2.   Methodology of study:

•   **Short term and Medium term volatility:**

For studying effect of budget presentation on short term and medium term volatility, the descriptive statistic is calculated. Following test is applied in this paper:

1.   Paired sample t test: Paired sample t-test is a statistical technique that is used to compare two population means in the case of two samples that are correlated. Paired sample t-test is used in 'before-after' studies, or when the samples are the matched pairs, or when it is a case-control study.

$$t = \frac{\bar{d}}{\sqrt{s^2 / n}}$$

Where d bar is the mean difference between two samples, s² is the sample variance, n is the sample size and t is a paired sample t-test with n-1 degrees of freedom. An alternate formula for paired sample t-test is:

$$t = \frac{\Sigma d}{\sqrt{\frac{n\left(\Sigma d^2\right)-\left(\Sigma d\right)^2}{n-1}}}$$

After calculating the parameter, we will compare the calculated value with the table value. If the calculated value is greater than the table value, then we will reject the null hypothesis for the paired sample t-test. If the calculated value is less than the table value, then we will accept the null hypothesis and say that there is no significant mean difference between the two paired samples.

In this study, the null hypothesis, H_0 have assumed that the budget has no impact on stock market. Null hypothesis have been tested at 5% level of significance.

• **Long term volatility:**All the results are computed on the basis of R_t which is the rate of return r in period t, computed as logarithmic first difference. The descriptive statistic is calculated to know the nature of time series. Following tests are applied in this paper:

1. **Stationarity Test:**Unit root tests from Augmented Dickey Fuller (ADF) (Dickey & Fuller, 1981) technique is applied to each series to determine their order of integration.

$$X_t = In(S_t | S_{t-1})$$

Where X_t represents the return of Index.

2. **ARCH LM test:** One of the key assumptions of ordinary regression model is that the errors have the same variance throughout the sample. This is also called the homoscedasticity model. If the error variance is not constant, the data are said to be hetroscedastic. In the presence of hetroscedasticity, ordinary regression do not render best linear unbiased estimator (BLUE). We have used ARCH LM method to test the hetroscedasicity in the time series.

Engle (1982) introduced a new approach for modeling heteroscedasticity in a time series. He called it the ARCH (Autoregressive conditional heteroscedasticity) model. The process by which the variances are generated is assumed to be as follows:

$$\sigma_1^2 = \alpha_0 + \alpha_1\mu^2{}_{t-1}+\ldots\ldots\ldots+\alpha_p\mu^2{}_{t-p}$$

This equation is known as p^{th} order ARCH process.

The null hypothesis is:

H_0= There is no ARCH effect.

H_1= There is ARCH effect.

3.   C GARCH-M: We have used the Component GARCH Mean (CGARCH M) model proposed by Engle and Lee (1999) in our research as many researchers find it superior volatility model as CGARCH model makes it possible to model separately the effect of spillovers on stock return volatility in the short and long run (Christoffersen et al., 2006).

Following Equation represents the Mean equation:

$$X_t = \alpha_0 + \alpha_1 X_{t-1} + \alpha_2 D + \varepsilon_t + \gamma h_t^2$$

Where α_0 represents intercept

X_{t-1} represents the lagged returns of different indices

D represents the dummy which is zero before budget presentation and one after budget presentation

γ represents risk premium

ε_t represents error term

$$h_t^2 = q_t + \alpha(\varepsilon_{t-1}^2 - q_{t-1}) + \beta(h_{t-1}^2 - q_{t-1})$$
$$q_t = \omega + \rho(q_{t-1} - \omega) + \varphi(\varepsilon_{t-1}^2 - h_{t-1}^2)$$

Where q_t represents intercept

α represents ARCH i.e. response to news

β shows GARCH effect

ω shows the long run component of conditional variance

ρ reflect AR term

φ represent forecasted error

4.   Ordinary Least Square Regression Model:

One of the key assumptions of ordinary regression model is that the errors have the same variance throughout the sample. This is also called the homoscedasticity model. Since some of the series in our data is homoscedastic, we have to use ordinary least square method to determine the volatility. Following is the equation of OLS model:

$R_t = \beta_0 + \beta_1 R_{t-1} + \beta_2 Dummy$

Where β_0 measures the volatility, β_1 measures the dependence of return on its lagged value; β_2 depicts dummy variable

Data analysis and interpretation

Table 4.1 shows the descriptive statistic of prices of Indices for pre budget & post budget period. The result shows that the average prices of all the indices increased in post budget period in 2010, 2011 and 2015 while it decreased for all indices in 2012, 2013 and 2014. The volatility can be expressed in form of standard deviation of prices. The standard deviation of all the indices has increased in post budget period for 2010 and 2011 which implies increase in volatility.It has decreased for all the indices in 2011, 2013, 2014 and 2015 except CNX Nifty Junior in 2013.

Table 4.1: Descriptive statistic for short term period

Year	Indices	Mean		Standard deviation	
		Before	After	Before	After
2010	CNX Nifty	4862.8	5061.78	6.30496	38.98161
	CNX Nifty Junior	9927.73	10470.9	9.13596	152.66
	S&P BSE Sensex	16201.4	16701.59	43.00760	234.40657
	S&P BSE 100	5016.099	5226.61	3.47337	42.82186
2011	CNX Nifty	5334.53	5532.41	91.35442	8.85357
	CNX Nifty Junior	10478.33	10804.3	184.71409	2.50067
	S&P BSE Sensex	17726.56	18222.23	369.45270	243.67081
	S&P BSE 100	5376.39	5562.11	86.40002	6.39886
2012	CNX Nifty	5424.63	5298.95	41.91245	57.84643
	CNX Nifty Junior	10562.15	10306.4	104.72522	160.17852
	S&P BSE Sensex	17802.923	17397.08	122.07	178.497
	S&P BSE 100	9392.68	9162.3	74.42789	106.32803
2013	CNX Nifty	5804.33	5734.150	47.14160	44.66394
	CNX Nifty Junior	11689.48	11550.066	81.71200	83.85637
	S&P BSE Sensex	19166.41	18979.88	158.73892	142.85720
	S&P BSE 100	5830.25	5750.76	45.90035	44.99
2014	CNX Nifty	7665.11	7480.13	107.39605	40.37667

	CNX Nifty Junior	16402.78	15843.76	471.85970	238.89530
	S&P BSE Sensex	25709.0	25086.66	345.57271	123.27327
	S&P BSE 100	7768.00	7567.67	130.76701	52.35306
2015	CNX Nifty	8765.23	8958.55	80.39397	36.83300
	CNX Nifty Junior	8754.43	8950.96	82.71113	39.25816
	S&P BSE Sensex	28991.58	29477.86	237.16084	107.72774
	S&P BSE 100	8863.6	9065.96	80.87482	37.93034

Paired t test (2 tailed) was applied to test the null hypothesis of budget having no impact on stock market. The results of table 4.2 show that we can't reject the null hypothesis for all indices in year 2011, 2012, 2014 and 2015 as actual value is less than table value. However, we can reject the null hypothesis for all indices except S&P BSE Sensex in 2010 and for CNX Nifty in 2013. The whole analysis reveals that budget don't have significant effect on stock market in short term.

Table 4.2: Paired t test for short term

Year	Indices	Actual value	Table value	P value
2010	CNX Nifty	-7.610	$\pm$4.303	.017*
	CNX Nifty Junior	-6.013	$\pm$4.303	.027*
	S&P BSE Sensex	-4.007	$\pm$4.303	.057
	S&P BSE 100	-7.876	$\pm$4.303	.016*
2011	CNX Nifty	-3.439	$\pm$4.303	.075
	CNX Nifty Junior	-3.048	$\pm$4.303	.093
	S&P BSE Sensex	-1.414	$\pm$4.303	.293
	S&P BSE 100	-3.503	$\pm$4.303	.073
2012	CNX Nifty	2.274	$\pm$4.303	.151
	CNX Nifty Junior	1.813	$\pm$4.303	.212
	S&P BSE Sensex	2.433	$\pm$4.303	.135
	S&P BSE 100	2.310	$\pm$4.303	.147
2013	CNX Nifty	1.976	$\pm$4.303	.187
	CNX Nifty Junior	5.893	$\pm$4.303	.028*

		1.565	±4.303	.258
	S&P BSE Sensex	1.565	±4.303	.258
	S&P BSE 100	2.608	±4.303	.121
2014	CNX Nifty	2.368	±4.303	.141
	CNX Nifty Junior	1.421	±4.303	.291
	S&P BSE Sensex	2.497	±4.303	.130
	S&P BSE 100	2.021	±4.303	.181
2015	CNX Nifty	-2.856	±4.303	.104
	CNX Nifty Junior	-2.791	±4.303	.108
	S&P BSE Sensex	-2.444	±4.303	.134
	S&P BSE 100	-2.960	±4.303	.098

*Shows significance at 5%

Table 4.3 shows the descriptive statistic of prices of Indices for pre budget & post budget period. The result shows that the average prices of all the indices increased in post budget period in 2010, 2011, 2014 and 2015 (except CNX Nifty Junior in 2014 and S&P BSE Sensex in 2015) . The volatility can be expressed in form of standard deviation of prices. The standard deviation of all the indices has increased in post budget period for 2010, 2013, 2014 and 2015 (except CNX Nifty Junior in 2010 and 2014) which implies increase in volatility. It has decreased for all the indices in 2011 and 2012 (except CNX Nifty Junior in 2012)

Table 4.3: Descriptive statistic for medium term period

Year	Indices	Mean		Standard deviation	
		Before	After	Before	After
2010	CNX Nifty	4824.14	5143.93	56.56396	70.01902
	CNX Nifty Junior	10002.59	10541.58	95.06499	94.32477
	S&P BSE Sensex	16133.73	17191.54	182.66494	234.20738
	S&P BSE 100	4990.99	5297.47	51.80207	57.75051
2011	CNX Nifty	5394.22	5476.22	105.81483	59.00943
	CNX Nifty Junior	10622.18	10725.02	270.10864	83.21627
	S&P BSE Sensex	17856.85	18105.63	337.30850	194.56126
	S&P BSE 100	5434.22	5511.81	106.76735	54.34109

2012	CNX Nifty	5354.84	5270.11	79.36352	59.87171
	CNX Nifty Junior	10355.7	10354.3	167.66593	191.60319
	S&P BSE Sensex	17495.59	17193.54	237.47648	169.94175
	S&P BSE 100	9267.94	9119.62	134.91234	106.72463
2013	CNX Nifty	5885.09	5816.90	53.47527	95.09534
	CNX Nifty Junior	11914.45	11586.90	163.32183	224.41587
	S&P BSE Sensex	19438.75	19255.93	180.35994	302.35000
	S&P BSE 100	5920.37	5828.3420	60.03284	99.10123
2014	CNX Nifty	7608.66	7673.46	96.95859	121.95260
	CNX Nifty Junior	16366.65	16229.3	395.84167	238.53629
	S&P BSE Sensex	25457.86	25716.91	343.62600	408.52471
	S&P BSE 100	7729.237	7756.48	106.98667	115.23801
2015	CNX Nifty	8741.16	8746.98	110.18619	143.15990
	CNX Nifty Junior	8729.54	8761.46	112.57634	131.03819
	S&P BSE Sensex	28922.618	28816.6	355.33754	454.33275
	S&P BSE 100	8833.78	8866.29	112.96945	138.94028

Table 4.4 depicts the results of paired t test for medium term period. We can reject the null hypothesis for all the indices in year 2010, 2011, 2012, 2013 and 2014 except CNX Nifty Junior (2011, 2012& 2014). However, we can't reject the null hypothesis for all indices in year 2015.The results of paired t test shows that budget have significant effect on stock market in medium term in 2010, 2011, 2012, 2013 and 2014.

Table 4.4: Paired t test for medium term period

Year	Indices	Actual value	Table value	P value
2010	CNX Nifty	-23.805	±2.145	.000*
	CNX Nifty Junior	-16.770	±2.145	.000*
	S&P BSE Sensex	-24.574	±2.145	.000*
	S&P BSE 100	-23.078	±2.145	.000*
2011	CNX Nifty	-2.786	±2.145	.015*
	CNX Nifty Junior	-1.451	±2.145	.169

Year	Index			
	S&P BSE Sensex	-2.363	±2.145	.033*
	S&P BSE 100	-2.689	±2.145	.018*
2012	CNX Nifty	3.861	±2.145	.002*
	CNX Nifty Junior	.029	±2.145	.977
	S&P BSE Sensex	4.701	±2.145	.000*
	S&P BSE 100	3.495	±2.145	.004*
2013	CNX Nifty	3.132	±2.145	.007*
	CNX Nifty Junior	6.084	±2.145	.000*
	S&P BSE Sensex	2.717	±2.145	.017*
	S&P BSE 100	3.872	±2.145	.002*
2014	CNX Nifty	-3.094	±2.145	.008*
	CNX Nifty Junior	1.445	±2.145	.170
	S&P BSE Sensex	-3.697	±2.145	.002*
	S&P BSE 100	-1.310	±2.145	.211
2015	CNX Nifty	-.095	±2.145	.926
	CNX Nifty Junior	-.543	±2.145	.596
	S&P BSE Sensex	.543	±2.145	.596
	S&P BSE 100	-.532	±2.145	.603

*Shows significance at 5%

The results of descriptive statistic are shown in Table 4.5. The average return and standard deviation for most of the indices are positive. The negative skewness of most of the indices exhibits that the returns distributions of the market have higher probabilityof providing negative returns. The high values of kurtosis ascompared to 3, exhibits that returns of most indices have a heavier tail thanthe standard normal distribution. The Jarque Bera test is used to test the normalityof the distribution. The test has the following hypothesis: H_0: Distributionis normal. H_a: Distribution is not normal. If the value of p is<.05,reject the null hypothesis. The Jarque-Bera test also rejects the null hypothesis of the normality for majority of indices as p value is less than 0.05 which implies that the seriesdoesn't follow random walk.

Table 4.5: Descriptive statistic for long term

Year	Index	Mean	Standard	Skewness	Kurtosis	Jarque-

			deviation			Bera
2010	CNX Nifty	0.00063	0.01078	-0.11953	3.88533	8.65487
						(0.0132)
	CNX Nifty Junior	0.00136	0.01103	-0.43187	3.90524	16.11188
						(0.0003)
	S&P BSE Sensex	0.00059	0.01057	-0.06669	3.88919	8.32027
						(0.0156)
	S&P BSE 100	0.00068	0.01046	0.01046	4.05281	13.59211
						(0.0011)
2011	CNX Nifty	-0.00036	0.01172	0.14148	2.96277	0.84841
						(0.6543)
	CNX Nifty Junior	-0.00073	0.01175	-0.06636	3.29553	1.09324
						(0.5789)
	S&P BSE Sensex	-0.00035	0.01165	0.14731	2.95754	0.92292
						(0.6304)
	S&P BSE 100	-0.00045	0.01129	0.12662	2.97956	0.67242
						(0.7145)
2012	CNX Nifty	0.00021	0.01212	0.06042	3.28848	1.01496
						(0.6020)
	CNX Nifty Junior	-8.63×10^{-5}	0.01201	-0.16313	3.53134	4.033462
						(0.1330)
	S&P BSE Sensex	0.00014	0.01192	0.07718	3.38408	1.784904
						(0.4097)
	S&P BSE 100	-0.00213	0.03678	-13.1344	194.0735	378191.3
						(0.0000)
2013	CNX Nifty	0.00016	0.00988	-0.37934	4.79397	39.20434
						(0.0000)
	CNX Nifty Junior	0.00025	0.01057	-0.55115	3.48170	14.95334
						(0.0006)

2249-2496

	S&P BSE Sensex	0.00027	0.00958	-0.35734	4.73255	36.29612
						(0.0000)
	S&P BSE 100	0.00016	0.00981	-0.47755	4.59671	35.77104
						(0.0000)
2014	CNX Nifty	0.00112	0.00799	0.01223	3.52416	2.78788
						(0.2481)
	CNX Nifty Junior	0.00149	0.01128	-0.4295	4.45453	28.8922
						(0.0000)
	S&P BSE Sensex	0.00108	0.00794	0.09007	3.55384	3.434333
						(0.1796)
	S&P BSE 100	-0.01316	0.22038	-15.1986	232.3354	524037.5
						(0.0000)
2015	CNX Nifty	-1.31×10^{-5}	0.00998	-1.13979	8.25603	335.0617
						(0.0000)
	CNX Nifty Junior	7.66×10^{-5}	0.01012	-1.3003	9.40686	490.0625
						(0.0000)
	S&P BSE Sensex	-8.9×10^{-5}	0.00993	-1.14233	8.43099	355.8323
						(0.0000)
	S&P BSE 100	3.01×10^{-6}	0.01012	-1.28301	9.32559	477.6253
						(0.0000)

We have applied ARCH LM test to check the presence of heteroscedasticity. Table 4.6 reports the results of ARCH LM test. This test rejects the null hypotheses of no ARCH effect for all the indices in 2010, 2012 and 2013. However, test fails to reject the null hypothesis for all indices in 2011, 2014 and 2015 except CNX Nifty Junior in 2011 and S&P BSE 100 in 2014which implies that ordinary regression model will be inefficient to check the effect of budget presentation on long term volatility. Therefore, we have to apply CGARCH-M model which take care of heteroskedastic.

Table 4.6: ARCH LM test for long term

Year	Index	F Statistic	Observed R Squared
2010	CNX Nifty	2.53734	21.66282
		(0.0086)	(0.0100)
	CNX Nifty Junior	4.37134	35.00787
		(0.0000)	(0.0000)
	S&P BSE Sensex	2.37458	20.39282
		(0.0138)	(0.0156)
	S&P BSE 100	2.92414	24.6221
		(0.0026)	(0.0034)
2011	CNX Nifty	1.03790	9.36682
		(0.4105)	(0.4041)
	CNX Nifty Junior	2.94358	24.78885
		(0.0025)	(0.0032)
	S&P BSE Sensex	0.87076	7.90817
		(0.5520)	(0.5434)
	S&P BSE 100	0.86472	7.85506
		(0.5575)	(0.5488)
2012	CNX Nifty	2.48586	21.2716
		(0.0099)	(0.0114)
	CNX Nifty Junior	2.22417	15.09511
		(0.0331)	(0.0347)
	S&P BSE Sensex	3.08003	25.81431
		(0.0016)	(0.0021)
	S&P BSE 100	6.91151	51.05245
		(0.0000)	(0.0000)
2013	CNX Nifty	5.18726	40.45034
		(0.0000)	(0.0000)
	CNX Nifty Junior	5.08552	39.78962
		0.000003	(0.0000)

	S&P BSE Sensex	4.56405	36.33243
		(0.0000)	(0.0000)
	S&P BSE 100	5.42856	41.99998
		(0.0000)	(0.0000)
2014	CNX Nifty	0.08224	0.08290
		(0.7745)	(0.7734)
	CNX Nifty Junior	1.61911	14.29152
		(0.1108)	(0.1123)
	S&P BSE Sensex	0.42895	3.96500
		(0.9186)	(0.9137)
	S&P BSE 100	2.53963	21.62123
		(0.0086)	(0.0101)
2015	CNX Nifty	1.07015	9.64652
		(0.3858)	(0.3798)
	CNX Nifty Junior	0.99456	8.99106
		(0.4453)	(0.4380)
	S&P BSE Sensex	0.92826	8.41302
		(0.5012)	(0.4931)
	S&P BSE 100	1.14359	10.27964
		(0.3330)	(0.3283)

Table 4.7 represents the mean equation of C GARCH M. $\propto_0$ measures the effect of other variables which are not included in equation. The coefficient of $\propto_0$ is significant forCNX Nifty, S&P BSE Sensex and S&P BSE 100 in 2010 which implies that volatility of these indices depend on some other factors which are not included in equation. $\propto_1$ measure the relation of returns with their lagged returns and the coefficient is significant for CNX Nifty Junior (2011, 2012 and 2013), S&P BSE Sensex (2012) and S&P BSE 100 (2014). This shows that returns of majority indices are not significantly related to its lagged returns. $\propto_2$ measures the dummy coefficient which is significant only for S&P BSE 100 in 2014. This implies that returns of indices are not significantly affected by budget presentation in long term. γ measures GARCH which is significant only for returns of CNX Nifty, S&P BSE Sensex and S&P BSE 100 in 2010.

This implies that theses indices have provided higher returns during the high volatility period in 2010.

Table 4.7: C GARCH M- Mean test for long term

Year	Index	$\propto_0$	α_1	α_2	γ
2010	CNX Nifty	-0.004289	0.025683	0.001833	39.04334
		(0.0288)	(0.7144)	(0.1571)	(0.0339)
	CNX Nifty Junior	-0.00027	0.101595	0.000734	12.79501
		(0.8594)	(0.1849)	(0.5728)	(0.2951)
	S&P BSE Sensex	-0.00428	0.043329	0.001755	40.10188
		(0.0246)	(0.5427)	(0.1626)	(0.0336)
	S&P BSE 100	-0.00374	0.048638	0.001838	36.78719
		(0.0217)	(0.4863)	(0.1291)	(0.0255)
2011	CNX Nifty	-	-	-	-
		-	-	-	-
	CNX Nifty Junior	-0.0036	0.220462	0.00063	25.35706
		(0.3008)	(0.0023)	(0.6635)	(0.3332)
	S&P BSE Sensex	-	-	-	-
		-	-	-	-
	S&P BSE 100	-	-	-	-
		-	-	-	-
2012	CNX Nifty	0.000791	0.024943	$-2.78X10^{-6}$	-5.350003
		(0.8427)	(0.6818)	(0.9989)	(0.8285)
	CNX Nifty Junior	0.004693	0.121876	-0.00067	-38.0357
		(0.1093)	(0.0475)	(0.6546)	(0.0525)
	S&P BSE Sensex	0.002814	0.139851	-0.00242	-2.33157
		(0.0578)	(0.0494)	(0.1455)	(0.7466)
	S&P BSE 100	0.002562	0.039475	-0.00315	-0.55517
		(0.3464)	(0.648)	(0.099)	(0.9671)
2013	CNX Nifty	$-7.13X10^{-5}$	0.084379	-0.001538	12.65718
		(0.95)	(0.2716)	(0.3097)	(0.4635)

	CNX Nifty Junior	0.000321	0.173274	-0.00249	12.75019
		(0.8819)	(0.0148)	(0.2144)	(0.6439)
	S&P BSE Sensex	-0.0009	0.072762	-0.0017	23.50786
		(0.4752)	(0.304)	(0.2934)	(0.2437)
	S&P BSE 100	0.000434	0.087608	-0.00178	8.902027
		(0.7413)	(0.2341)	(0.2555)	(0.6688)
2014	CNX Nifty	-	-	-	-
		-	-	-	-
	CNX Nifty Junior	-	-	-	-
		-	-	-	-
	S&P BSE Sensex	-	-	-	-
		-	-	-	-
	S&P BSE 100	0.010448	-7.30556	-0.08065	-0.28349
		(0.3078)	(0.0000)	(0.0000)	(0.7515)
2015	CNX Nifty	-	-	-	-
		-	-	-	-
	CNX Nifty Junior	-	-	-	-
		-	-	-	-
	S&P BSE Sensex	-	-	-	-
		-	-	-	-
	S&P BSE 100	-	-	-	-
		-	-	-	-

Table 4.8 represents the variance equation of C GARCH M. α measures ARCH effect which is significant for CNX Nifty (2010), CNX Nifty Junior (2011), S&P BSE Sensex (2010 & 2012) and S&P BSE 100 (2010 & 2012). This shows that recent news will affect stock market upto some level. β measures the persistence of volatility in the market and is significant for all the indices except S&P BSE 100 (2014). The coefficient of ω is significant for all the indices except CNX Nifty (2012), CNX Nifty Junior (2011 & 2013) and S&P BSE 100 (2014) which measures time invariant permanent level of volatility. This implies that there is minimum level of

permanent volatility which will be always in the market irrespective of time and factors considered in the study.

The coefficient of ρmeasures permanent component of volatility which is positive and higher than the ones corresponding to the transitory component, reflecting the fact that the permanent volatility component is stronger than the short-term one. Thus, volatility in prices of all the indices is of long term nature during 2010-2015.The coefficients corresponding to the error term (φ) are in most of the cases positive except S&P BSE 100 (2012), suggesting a higher shock impact on the permanent component of the volatility.

The transitory component (α+β) i.e. short term component of volatility is negative for most of the indices except CNX Nifty(2012), CNX Nifty Junior (2012 & 2013) and S&P BSE 100 (2012 & 2014) which confirms long-term nature of shocks.

Table 4.8: C GARCH M- Variance test for long term

Year	Index	Ω	ρ	φ	α	β	α+β
2010	CNX Nifty	0.000114	0.957691	0.085302	0.114307	-0.580574	-0.466267
		(0.0001)	(0.0000)	(0.0162)	(0.1395)	(0.0662)	
	CNX Nifty Junior	0.000136	0.968968	0.162019	0.022058	-0.90039	-0.878332
		(0.1677)	(0.0000)	(0.0051)	(0.5791)	(0.0001)	
	S&P BSE Sensex	0.000109	0.960244	0.079751	0.127277	-0.5922	-0.464923
		(0.0001)	(0.0000)	(0.0169)	(0.1051)	(0.0278)	
	S&P BSE 100	0.000111	0.957738	0.105335	0.131546	-0.53491	-0.403364
		(0.0016)	(0.0000)	(0.0101)	(0.0997)	(0.0785)	
2011	CNX Nifty	-	-	-	-	-	-
		-	-	-	-	-	
	CNX Nifty Junior	0.000131	0.896223	0.091999	0.082296	-0.62019	-0.537894
		(0.0000)	(0.0000)	(0.2629)	(0.3684)	(0.176)	
	S&P BSE Sensex	-	-	-	-	-	-
		-	-	-	-	-	

	S&P BSE 100	-	-	-	-	-	-
		-	-	-	-	-	
2012	CNX Nifty	-0.00074	0.999219	0.020855	-0.078061	0.213473	0.135412
		(0.9276)	(0.0000)	(0.2453)	(0.0717)	(0.776)	
	CNX Nifty Junior	9.75×10^{-5}	0.987709	0.037783	-0.13585	0.257756	0.121906
		(0.1908)	(0.0000)	(0.0335)	(0.0000)	(0.581)	
	S&P BSE Sensex	0.000192	0.961364	0.11533	0.06233	-0.63517	-0.57284
		(0.0174)	(0.0000)	(0.0254)	(0.4463)	(0.2636)	
	S&P BSE 100	0.000186	0.926604	-0.00114	0.180359	0.544871	0.72523
		(0.0000)	(0.0156)	(0.9837)	(0.0201)	(0.0014)	
2013	CNX Nifty	0.00256	0.98872	0.067924	-0.096543	-0.677649	-0.774192
		(0.9218)	(0.0000)	(0.0174)	(0.0252)	(0.0005)	
	CNX Nifty Junior	6.75×10^{-6}	0.99767	0.048087	-0.02103	0.478667	0.457637
		(0.9759)	(0.0000)	(0.1677)	(0.8222)	(0.8866)	
	S&P BSE Sensex	0.000158	0.992156	0.069032	-0.07747	-0.81121	-0.88868
		(0.4641)	(0.0000)	(0.0378)	(0.0616)	(0.0000)	
	S&P BSE 100	0.001322	0.98959	0.059243	-0.10382	-0.0115	-0.11532
		(0.6206)	(0.0000)	(0.0209)	(0.0233)	(0.9856)	
2014	CNX Nifty	-	-	-	-	-	-
		-	-	-	-	-	
	CNX Nifty Junior	-	-	-	-	-	-
		-	-	-	-	-	
	S&P BSE Sensex	-	-	-	-	-	-
		-	-	-	-	-	
	S&P BSE 100	0.05784	0.906805	0.281117	0.731393	0.17141	0.902803
		(0.5689)	(0.3603)	(0.1772)	(0.0000)	(0.7669)	

2015	CNX Nifty	-	-	-	-	-	-
		-	-	-	-	-	
	CNX Nifty Junior	-	-	-	-	-	-
		-	-	-	-	-	
	S&P BSE Sensex	-	-	-	-	-	-
		-	-	-	-	-	
	S&P BSE 100	-	-	-	-	-	-
		-	-	-	-	-	

ARCH LM test is applied again to see whether there is any leftover arch effect in the series. Table 4.9 reports the result of ARCH LM test. ARCH LM test can not reject the null hypothesis of no heteroscedasticity which shows that series don't have any leftover arch effect.

Table 4.9: ARCH LM

Year	Index	F Statistic	Observed R Squared
2010	CNX Nifty	1.00828	9.11014
		(0.4341)	(0.4271)
	CNX Nifty Junior	0.45499	4.19962
		(0.9032)	(0.8977)
	S&P BSE Sensex	0.45406	0.45694
		(0.5010)	(0.4990)
	S&P BSE 100	0.95776	8.67037
		(0.4759)	(0.4682)
2011	CNX Nifty	-	-
		-	-
	CNX Nifty Junior	0.62273	5.70916
		(0.7771)	(0.7686)
	S&P BSE Sensex	-	-
		-	-
	S&P BSE 100	-	-

		-	-
2012	CNX Nifty	0.52933	0.53251
		(0.4675)	(0.4655)
	CNX Nifty Junior	0.61145	5.60862
		(0.7867)	(0.7783)
	S&P BSE Sensex	0.33871	0.34101
		(0.5611)	(0.5592)
	S&P BSE 100	0.51895	4.77713
		(0.8601)	(0.8532)
2013	CNX Nifty	0.75353	0.75737
		(0.3862)	(0.3841)
	CNX Nifty Junior	0.83843	7.62451
		(0.5814)	(0.5723)
	S&P BSE Sensex	0.85339	0.857392
		(0.3565)	(0.3544)
	S&P BSE 100	0.335639	3.11201
		(0.9624)	(0.9596)
2014	CNX Nifty	-	-
		-	-
	CNX Nifty Junior	-	-
		-	-
	S&P BSE Sensex	-	-
		-	-
	S&P BSE 100	1.731740	15.20812
		(0.0832)	(0.0853)
2015	CNX Nifty	-	-
		-	-
	CNX Nifty Junior	-	-
		-	-
	S&P BSE Sensex	-	-

	S&P BSE 100	-	-
		-	-
		-	-

Since some of the series in our data is homoscedastic, we have to use ordinary least square method to determine the volatility. Table 4.10 shows the results of OLS regression model. The coefficient of volatility i.e. β_0 is insignificant for all the indices. The coefficient of $\beta_1$is significantfor CNX Nifty, CNX Nifty Junior and S&P BSE Sensex which implies that their returns are significantly related to lagged returns. The coefficient of dummy i.e. β_2 is insignificant for all the indices which implies that the budget don't have effect on stock market in long term.

Table 4.10: OLS Regression Model

Year	Index	β_0	β_1	β_2
2010	CNX Nifty	-	-	-
		-	-	-
	CNX Nifty Junior	-	-	-
		-	-	-
	S&P BSE Sensex	-	-	-
		-	-	-
	S&P BSE 100	-	-	-
		-	-	-
2011	CNX Nifty	-0.00025	0.09396	-0.00016
		(0.8161)	(0.1417)	(0.9117)
	CNX Nifty Junior	-	-	-
		-	-	-
	S&P BSE Sensex	-0.00022	0.10038	-0.00019
		(0.836)	(0.1162)	(0.8957)
	S&P BSE 100	-0.00043	0.116411	6.60×10^{-5}
		(0.672)	(0.0682)	(0.9632)

2012	CNX Nifty	-	-	-
		-	-	-
	CNX Nifty Junior	-	-	-
		-	-	-
	S&P BSE Sensex	-	-	-
		-	-	-
	S&P BSE 100	-	-	-
		-	-	-
2013	CNX Nifty	-	-	-
		-	-	-
	CNX Nifty Junior	-	-	-
		-	-	-
	S&P BSE Sensex	-	-	-
		-	-	-
	S&P BSE 100	-	-	-
		-	-	-
2014	CNX Nifty	0.00129	0.16920	-0.00064
		(0.0657)	(0.0081)	(0.5272)
	CNX Nifty Junior	0.00159	0.12491	-0.0004
		(0.1102)	(0.051)	(0.7813)
	S&P BSE Sensex	0.001293	0.166834	-0.00071
		(0.0649)	(0.0091)	(0.4804)
	S&P BSE 100	-	-	-
		-	-	-
2015	CNX Nifty	0.00071	0.08005	-0.00144
		(0.4405)	(0.2133)	(0.259)
	CNX Nifty Junior	0.00076	0.07313	-0.0014
		(0.4126)	(0.2544)	(0.2825)
	S&P BSE Sensex	0.00063	0.06561	-0.00142
		(0.495)	(0.3068)	(0.2674)

	S&P BSE 100	0.00072	0.07366	-0.00144
		(0.4394)	(0.2509)	(0.2676)

4.   Conclusion

The effect of budget presentation on stock market volatility is checked by segregated whole time period into short term, medium term and long term periods. Descriptive statistic and paired t test is applied for measuring short term volatility and medium term volatility. The results revealed that budget don't have significant effect on stock market in short term. The paired t test for medium term shows that budget have significant effect on medium term volatility of stock market for 2010, 2011, 2012, 2013 and 2014.This implies that stock market takes time to absorb the effect of budget announcement and get depicted in its prices within 15 days' time period. The long term volatility is measured by applying C GARCH M which reveals that budget have no significant effect on stock market in long term. However, the transitory component $(\alpha+\beta)$ i.e. short term component of volatility is negative for most of the indices except CNX Nifty (2012), CNX Nifty Junior (2012 & 2013) and S&P BSE 100 (2012 & 2014) which confirms long-term nature of shocks. This research has also tried to establish relation between stock market volatility and political party in power. But results reveal that no relation exist between stock market volatility and political party in power.

References:

1.   Babu, S. Suresh and Venkateswarlu, M. (2013). Impact of Union Budget on Indian Stock Prices. International Journal of Management Research and Review, 3(5), 2890-2896.

2.   Brown, S. J., & Warner, J. B. (1980). Measuring security price performance. Journal of Financial Economics, 8 (3), 205 - 258.

3.   Chotalia, P. (2013). Impact of union budgets on NSE from 2007 to 2011. VSRD International Journal of Business and Management Research, 3(8), 337-343

4.   Gupta, Arindam and Debashis Kundu (2006). A Study of the Impact of Union Budgets on Stock Prices in India. The ICFAI Journal of Applied Finance, 12(10), 65-76.

5.   Kaur, H. (2004). Stock market volatility in India. The Indian Journal of Commerce, 57 (4), 55-70.

6.   Kutchu, V. (2012). Testing semi-strong efficiency of Indian stock market - A study on effect of union budget 2012 on six select sectoral stocks. Researchers World Journal of Arts, Science & Commerce. 3-3 (2), 75-81.

7.   MacKinlay, A. C. (1997). Event studies in economics and finance. Journal of Economic Literature, 35 (1), 13-39

8.   Mohanty, Munmun(2004). Stock Market Reaction to Announcement of Policy Changes. The ICFAI Journal of Applied Finance, Dec 2004.

9.   Nageswara, Rao S.V.D (1997). Impact of Macroeconomic Events on Stock Price Behaviour. Management and Accounting Research, 1(1), 46-67.

10.   Porwal, Hamendra and Rohit Gupta (2005). The Stock market volatility. The Journal of Accounting & Finance, Vol. 20(1), 31-44.

11.   Saraswat, P., & Banga, J. (2012). Volatility of the Sensex with respect of Union Budget of India : A pragmatic study. International Journal of Accounting and Financial Management Research (IJAFMR), 2 (1), 19-31

12.   Shah, A., & Thomas, S. (2002). Stock market reaction to union budget. Economic & Political Weekly, 37 (5), 455-458

13.   Singh, G., & Kansal, G. (2010). Impact of union budget on Indian stock market A case study of NSE. Asia-Pacific Journal of Social Sciences, 2(1), 148-160.

14.   Singh, Gurcharan and Salony Kansal (2010). Impact of union budget on Indian stock market – A case study of NSE. Asia Pacific Journal of Social Sciences, 2(1), 148-160.

15.   Soni, A. (2010). Reaction of the stock market to union budget and monetary policy announcements. Asia Pacific Journal of Research in Business Management, 1 (2), 155- 175.

16.   Soni, Anil and Jalandhar. (2010). Reaction of the stock market to Union Budget and Monetary policy announcements. APJRBM,1(2),155-175.

17.   Thomas, Susan and Ajay Shah (2002). Stock Market Response to Union Budget. Economic and Political Weekly, 37(5), 455-458.

18.   Varadharajan, P. and P Vikkraman (2011). Impact of Pre and Post Budget on Stock Market Volatility between 2001 to 2011. Journal of Contemporary Research in Management, 6(4,) 49-64.