



Impact of Demonetization on Stock Market Return (A Study on Top Ten Software Companies)

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Abstract

The study focuses on demonetization and its effect on stock price of top ten software companies in India for a period of three months. Due to the change in regulation, the challenges faced by all the sectors were enormous. An event study is carried on demonetization to capture the market behavior. The sensitivity in the market due to demonetization will create a huge variation in the stock price. The study focuses on the event days in which demonetization had a great impact in stock market. Literature studies have taken different events to study variation in market behavior, among which demonetization stands as a prime event where the whole economy is disrupted. The impact of this disruption has also affected the stock market and its return. The study also captures the sentiments of the top ten software companies and the investors during the period of demonetization. In order to capture the movements of stock price returns at the time of the event, the study has employed time-series technique to ascertain the relationship between index and share price of the top ten software companies in India.

Keywords: Demonetization, Sentiment Analysis, Software Companies, Stock Exchange

JEL Classification: C3, C4, C5, G1, G4, L10

Paper Type: Research Paper

Introduction

The stock market in India was shaped more than a century ago, which can be oscillated easily by various internal and external factors. Stock Exchange is noted as an indispensable association of the Capitalistic System of economy. Innovation has advanced the most recent 20 years, making both the share trading system and media work progressively. The headway of innovation has expanded exchanging movement and the quantity of financial specialists who enter the share trading system. Close by, media has extended itself into the internet, because of the progression, collection of data is made quicker and in higher volumes through their channels. Stock costs climb and during each time because of vacillations in free market activity. In the event that more individuals need to purchase a specific stock, its market cost increases. On the other hand, if individuals want to sell, its cost will fall.

This connection among stock market activity is integrated with the kind of news reports that are issued at a specific minute, that directly affects the market, which can change a terrible day into a happy one or a happy day into an awful one, with its influence on stock price. Regardless of whether you're an experienced financial specialist or a fleeting speculator, it's critical to survey the news features intermittently. There might be positive news, negative news or news to which market may not respond by any means. Among all, negative news has more broad impact on stock costs and financial specialist supposition than the positive news. Stock prices respond intensely to antagonistic news that it might truly prevent normal individuals from needing to purchase stocks. The notion of the market is additionally an essential factor. To a great extent negative environment, the scarcest piece of troubling news is sufficient to send a stock tumbling. The connection between the news and the market can be exceedingly erratic by the best experts. Negative news will typically make people offer stocks. Dreadful profit reports, poor corporate administration, monetary and political vulnerability, and in addition sudden, grievous events will mean offering weight and an abatement in stock price.

Positive news will typically make people purchase stocks. Great income reports, expanded corporate administration, new items and acquisitions, and in addition positive generally speaking financial and political markers, convert into purchasing weight and an expansion in stock price. We could find that, on the day a daily paper strike happens, the offer turnover on the nation's securities exchange is all things considered 18% lower, yet stays unaltered on the days previously, then after the day of the event. The measurable importance is additionally amazingly solid notwithstanding the generally modest number of strike occasions which serve to recognize the effect of a strike – the coefficient gauge is noteworthy at the 0.1% level. The instability of the market is likewise decreased yet not essentially. The media animate exchanging of all stocks aside from the specific expansive, and add to the instability of the littlest stocks. One must be keen enough to interpret the news and rapidly get a handle on whether it will influence his stocks in any case and if truly, how much the news can have an effect on the stock market or his stocks.

In this paper, we take an event which has been a cause for stock market fluctuation in India (2016) – Demonetization (ban of Rs.500 and Rs.1000 which has been deposited or exchanged in banks on or before 30th December 2016), declared on post evening of 8th November 2016 as officially being considered from 9th November 2016. The reason behind the denial of higher denomination cash is to control fear-based erection of financing and destruction of black money (unaccounted cash). In any case, the slip of higher division money has made an insufficiency for trade out the monetary framework, prompting a lot of discomfort for the normal open and business exercises. As the Indian economy is more dependent on money, just one third of the population utilizes saving money framework for business and general exchanges, the demonetization striking the business and household was exceptionally extreme. As a combined effect of demonetization and US presidential election, the stock market indices dropped to an around six-month low in the week following the announcement. The day after the demonetization announcement, BSE SENSEX crashed nearly crushed by 1,688 points (6.12%) and NIFTY 50 plunged by over plunged by 541.30 points (6.33%). Before the end of the intraday trading segment on 15 November 2016, the BSE SENSEX file was brought down by 565 points and the NIFTY 50 list was underneath 8100 intraday. The rupee was esteemed to 66.85 for each US dollar around 23 paise. Investors with in India and also overseas have assumed that after demonetization there would be a possibility for progress in Indian economy. For analyzing the cause and effect of demonetization, event study has been carried down in this paper for examining, where the event is considered for the study is demonetization (8th November 2016). BSE SENSEX and Ten Software Companies has been considered for examination, reason behind choosing the sector

(software company) as they are considered to be the major contributors towards the economic growth, in terms of employment rate, inflation etc.,

Application of event study methodology is a most vividly used financial application. Event study also impacts economic events such as interest rate fluctuations, budget announcements, change in regulatory norms, oil crisis, terrorist attacks elections, stock market crash and other market changes that reflects on security prices which is of great interest for researchers in and around West and in India. The observational paper means to investigate the effect of demonetization on programming organizations and on its stock return, the occasion examine technique is generally used to quantify irregular returns, which measures the profits for particular variable. The current study takes in to account the effect of demonetization on ten software companies' stock prices. The objective behind demonetization may be surplus but its impact on stock market and its functionality would have taken a longer time period.

Literature Review

Various studies state the impact of an event on stock market, for example: a study states that the returns on the event days are more insecure when compared with the returns on the non-event days. Similarly, we could find the impact on S & P 500 Index due to major world events either it is because of political, economic or climatic. Even the corporate events bring in fluctuation in the stock market, the volatility in the market because of the events like dividend or stock split announcement and it is also found out that, these events impact the stock market to the extent of 60% as a whole (Schwert, G. W. 1990; Manning, N. 1991; Kothari, S. & Warner, J. 1997; Hamilton, J. D. 2008; Cutler M. D., et al, 1999). The political events also have significant influence on stock market, studies highlighting on various political events in and around the world, where few like: stock market's reaction during general elections, economical and other political events and inefficiency in stock prices for a short- term period. Impact of political hazard is higher in developing markets when contrasted with developed markets (Beaulieu, M., et al, 2005; Lin, C.T. & Wang, Y.H. 2003; Kumar, D. B., Sophia, S. and Jucunda, M. E. 2015; Kim, Harold, Y. and Jianping, M. 1999; Diamonte, R., et al 1996; Clark, E., Masood, O. & Tunaru, R. 2008). Negative events such as Terrorist attacks and War also have direct influence on stock market, studies based on these have also been carried out in order to capture its impact on stock market and found significant evidence for the same. (B. S. & Kucher, M 2000; Frey. Kolari and Pynnonen 2010) resolve this obnoxious element by signifying a procedure in which the combined abnormal returns are plotted to the comparative scale as the single day abnormal returns. (Cowan 1992; and Kolari and Pynnonen 2010) approve that the training loses control rapidly in terms of identifying an event resulting in total abnormal returns whether the occasion impact is appointed arbitrarily to a solitary event day within the event space for each stock.

Li, J, & Meesad, P. (2016), as per the optional connection among data and stock pattern, for instance, data, for example, remarks and tweets can be utilized for stock pattern forecast. Another issue is that the unpredictability of ordinary estimation scores to demonstrate to one day's sentiment. This is particularly caused by the unequal number among positive and negative inside one day, thus an extensive predisposition amongst opinion and stock pattern emerges. Babu, S. A. & Kumar, R. R. (2015), the impact of negative and positive sentiments on NSE index return reveals that the influence of negative sentiment on NSE index return is more than the positive sentiment. Rout, J. K., et al., (2018), sentiment analysis has applications in different settings, for example, in the social gatherings and study of feelings of individuals about various things like: review of a product, current issues, social concerns and political events. Opinions vary from person to

person, in this way the individual's opinions are said to be unique, where the Twitter tweets is a source that provides precious type of data. However, the advantage is also considered to be as a disadvantage when the available data are in huge volume and structuring them for analysis becomes a great challenge.

Chunxia, Z., Yize, J., Zhendong, N., Xiaolin, Z., and Zhenyan, L. (2014), the accuracy of stock market forecasting is increased by using the stock market forecasting method to analyze the emotional tendency data from the financial news webpage. The development is emotion provocative information via a financial news webpage, helps in improving the light properties markets high-precision. Yang, S. Y., et al., (2015), Twitter makes a different world inside the money related network, where the quantity of client is limitless, among them the prevailing twitter clients inside the monetary network, substitutes the connection between the financial market and social sentiment developments. The one-sided supposition made from these genuine hubs inside the financial community helps us in delivering a healthy forecast of financial markets when compared to the general social sentiment.

Dash, S. R., Mahakud, J. (2013), in spite of the fact that the impact of notion chance on industry-shorted portfolio returns proceeds through a concurrence with the hypothetical question, the cross-sectional uniqueness concerning different enterprises has been amazing depending on the openness of stocks in that specific industry. The shared trait of the estimation impact over the business isn't indistinguishable, as it is for the aggregate market. Samiran, J. (2016), say that the Indian stock price returns does not follow the traditional financing theory, which is said to be as an anomaly. The decision-making capacity of investors being irrational about the stock price movements are solely responsible for this, which directly or indirectly implies that "investors sentiment plays a major in the Indian stock market." Bayram, S. G. (2017), investigated the connection between the reasonable and non-adjusted opinions of the purchaser business and stock returns in creating securities exchange, Turkey. The result of the investigation demonstrates that the objective estimations of both the customer and business are decidedly and fundamentally influencing the Istanbul Stock Exchange-100 index returns. Dash, S. R. Mahakud, J. (2012), stock market is very fragile and sensitive, where the valuation of stocks are extremely troublesome and difficult to exchange with highlights which are intentionally preferential with the notion chance. It is viewed as juvenile to guarantee for the across the board evaluating ramifications of supposition chance in a multifaceted model framework.

Karalevicius, V. (2018), majority of the investors a likely said to be overreacting on news in a very short period of time, which is dependent on the risk-taking capacity of the individual investors, where the sentiment and confidence plays a major role. It is also said in the paper that there exists a relationship between media sentiment and Bitcoin price. Peng, C. H., et al., (2015), the customer satisfaction is considered to be an intangible asset that need to be treasured, which in turn generates positive abnormal returns. There are investors who are willing to invest in the stocks of the firm that holds a good score in terms of customer satisfaction, even when the stock market clutches negative beliefs. Seng, J. L., & Yang, H. F. (2017), found there exists a substantial relationship between the volatility of stock market and the financial news of an economy. It is found that the positive or negative news are positively or negatively correlated with stock returns, and the added information is also correlated with the stock returns accordingly. Verification on the stock market volatility is carried out in four different time periods, say as monthly, quarterly, semi-annually and annually. From the analysis, it can be said that the accuracy of the prediction models approaches nearing 66% and stock market volatility is affected in a specific time periods while predicting the trend, particularly by using moving window evaluation. The writing does not

talk about the cash demonetization and its effect on securities exchange returns, thus the reason for the present examination is to research the impact of demonetization (of higher esteem group money) on best thirty programming organizations share showcase returns.

Research Methods

Objective

The study has been undertaken with the objective of

1. To recognize the change in abnormal return of software companies (10) because of demonetization.
2. To recognize the relationship between CAR model and average return on stock price of the software companies.
3. To analyze the impact of BSE Index on stock price of ten software companies during demonetization.
4. To analyze the sentiments of software companies in the stock market due to demonetization.

Hypothesis

H₁: There is an impact in the abnormal return of companies because of demonetization.

H₂: There is a linkage between CAR and average return of stock price (log normal).

H₃: There exists a significant relationship among BSE Index and stock price of software companies during demonetization.

H₄: There exists a significant relationship among software companies and stock market behavior due to demonetization.

Sample

For the empirical study, the data is dependent on secondary source, where data for ten software companies were taken from BSE Sensex on daily basis for a period of six months from 01/10/2016 to 31/03/2017 for time-series analysis. The companies chosen must accomplish the following conditions:

- I. The selected thirty software companies must be listed in Indian Stock Exchange - BSE (SENSEX).
- II. The thirty software companies are supposed to have the stock market data of (-10, +10) days round the event (for CAR Computation).

Variables used in the study	
VARIABLES SELECTED	DETAILS
DEPENDENT VARIABLES	
CAR (+10, -10)	Cumulative abnormal returns for nearly 6months from 03-10-2016 to 18-04-2017 around the event (demonetization) for (-3, +3), (-5, +5) and (-7, +7).
BSE Index	Date collected for the period of 6 months
BINARY VARIABLES	
Average Share	Data collected for the period of 6 months (October, November, December, January, February, March and April)
Share price of 10 software companies	Data collected for the period of 6 months

Instruments

Event study - CAR

The market information in this investigation is utilized in the figuring of Cumulative Abnormal Returns (CAR) of acquirers around the securing declaration. The market information is gathered from the Bombay Stock Exchange site and is figured as demonstrated as follows.

The study uses a short-range event window for the evaluation duration of about -7 to +7 days round the declaration period. The Cumulative Abnormal Returns (CAR) is observed for (-3, +3), (-5, +5) and (-7, +7) days during the announcement.

The market model assumes that the stock returns are determined by the subsequent Ordinary Least Square equation:

$$NR_{jt} = \alpha_j + \beta_j R_{mt} + \epsilon_{jt}$$

NR_{jt} = normal rate of return for company j on day t;

R_{mt} = rate of return for market index m on day t;

ϵ_{jt} = error term for company j at time t.

The coefficients α_j and β_j are the ordinary least squares parameters of the intercept and slope, respectively, for company j.

The abnormal return AR_{jt} for the company j will then be calculated as:

$$AR_{jt} = R_{jt} - (\alpha_j + \beta_j R_{mt})$$

AR_{jt} = Abnormal return for company j on day t.

R_{jt} = Return for company j on day t

α_j = Estimate of OLS parameter of intercept

β_j = Estimate of OLS parameter of slope

R_{mt} = Rate of return of market index m on day t.

The Cumulative Abnormal Returns (CAR) is calculated using:

$$CAR(t, T) = \sum_{t=T}^t AR_t$$

AR_t = average abnormal return on day t;

t, T = Accumulation period

The CAR of a set of sample securities will be used to look at whether or not the values of the norm residuals, starting from the solar day of cumulating and up to a particular point, are systematically different from zero. (Chatterji & Kuenzi (2001)).

Regression

The regression functions of the form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \dots + \beta_N X_N + \epsilon$$

Where $\beta_0, \beta_1, \beta_2 \dots \beta_N$ are coefficients called the model regression co-efficient or parameters, which substance the regression scores identified statistically for the variable that have a significant level as .000. $X_1 + X_2 + X_3 + \dots X_N$ are the predictor variables in this study.

Time-Series Analysis (ARCH)

Auto Regressive Conditional Heteroscedasticity (ARCH) the expression "heteroscedasticity" alludes to evolving changes. As indicated by an ARCH model, it is not simply the fluctuation which changes with time; rather, it is the conditional variance that changes in a specific way, depending on the existing data. The conditional variance measures our uncertainty about the future observation. The conditional variance, however, is simply $\text{var}[x_t | x_{t-1}] = \text{var}[e_t] = \sigma$, which stays steady paying little respect to the given information. The curiosity of the ARCH model is that it enables the conditional variance to rely on the information.

E-views software is used for time series analysis.

Sentimental Analysis

Sentiment is nothing but the feeling, attitude, emotion or opinion of an individual regarding a certain issue. Sentiments are most expressed with emotions or smileys in social medias like Twitter and Facebook, where the actual feeling of people in large upon an issue can be captured easily, it is also said as the method of defining the emotional tone behind a words sequence, which is later used to improve an understanding of the attitudes, opinions and emotions expressed in an online reference.

Sentiment analysis is also known as opinion mining, which helps us in knowing the public opinion on certain topic by monitoring the social media, whose application is very powerful and used widely by organizations across world these days. The primary task in sentiment analysis in estimation investigation is arranging the extremity of the given content at the record, sentence, or highlight/angle level—regardless of whether the communicated feeling in a report, a sentence or an element include/perspective is sure, negative, or impartial. Developed, "beyond polarity" opinion grouping looks for passionate states, say for example, "happy", "sad", "angry", and "loving". Polarity analysis considers the measure of positive or negative terms that show up in a given sentence. It is helpful to some level since it completes a great job of organizing informational data sets. There exists an association between the changes in sentiments happening in social media and stock market, that is; change in sentiment affects the stock market, which leads to fluctuation in stock prices and market being volatile.

Analysis

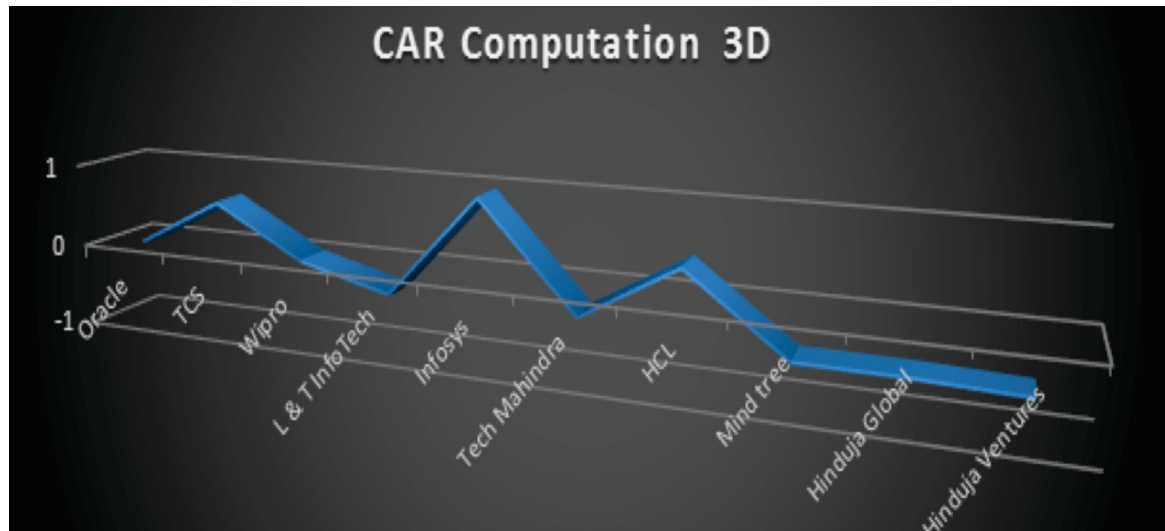
CAR Model

The average value of top thirty software companies as per days around the announcement (-3, +3), (-5, +5) and (-7, +7) are listed below:

Companies Name	3D	5D	7D
Oracle	0.015987	0.069204	0.01617
TCS	0.597544	-0.20532	0.04568
Wipro	-0.01246	-0.02142	-0.1674
L&T InfoTech	-0.29014	-0.18879	-0.1313
Infosys	0.937895	0.053529	0.01619
Tech Mahindra	-0.28917	0.018377	0.02868
HCL	0.384665	-0.9931	-0.0773
Mind tree	-0.48943	-0.34158	0.08146
Hinduja Global	-0.49311	-0.23932	1.10049
Hinduja Ventures	-0.53153	-0.07724	0.1103

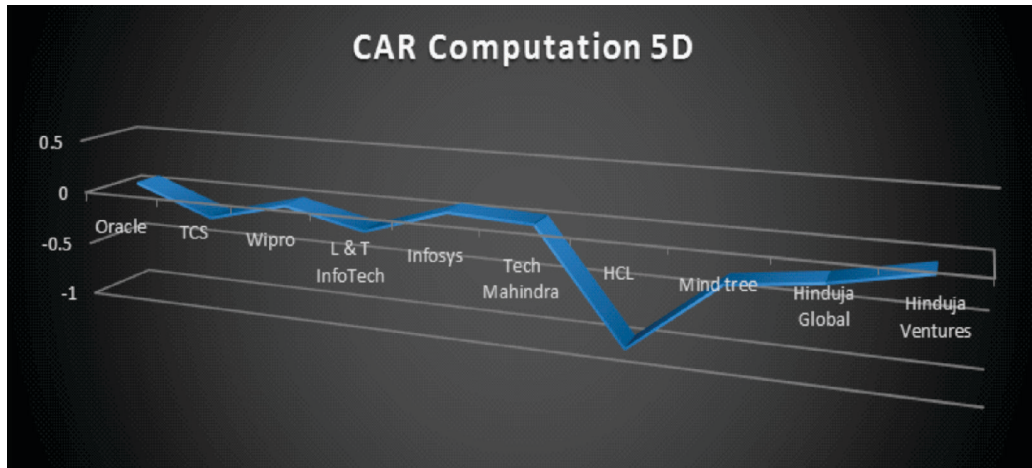
Observation

(-3, +3): a positive influence can be seen on software companies like Infosys, TCS and HCL with moderate positive impact for Oracle as it is as well progressive but lower when compared to others. The remaining companies performance is very low as the computed values are being negative.



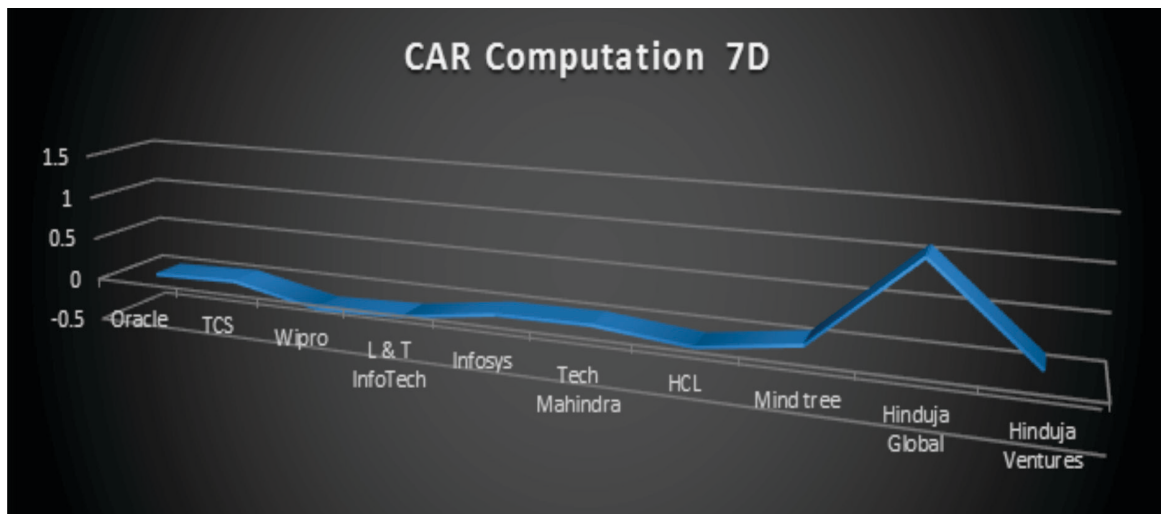
Observation

(-5, +5): There is positive influence on software companies like Infosys and Tech Mahindra with moderate positive impact whereas for Oracle it well positive but low when compared to the above-mentioned companies. The remaining companies performance is very low as they show negative impact with their values.



Observation

(-7, +7): all the companies except Wipro, L & T, HCL shows positive impact as the day increase, though the impact was not to a greater extend we could see that the market tends to move forward with the positive control.



Interpretation

From the analysis, we could interpret that the companies tend to show negative impact in the beginning of the demonetization, still it managing well in overcoming the hurdle in the later part. Even when the positive impact of the companies towards the market is not much, we could predict that the IT industry is well prepared to manage the unpredictability.

Regression

Regression analysis helps to identify the dependent and independent relationship amongst the variables. In this study, the Independent variable is the stock price of ten software companies and the dependent variable is the BSE Index.

Interpretation

From the analysis, we could find that the t-statistics values show that companies like TCS, L&T, Tech Mahindra and Hinduja Global behaved abnormally (as the values are negative). When the probability value is less than 0.05 is considered to be significant, with which from the above data we could say that apart from HCL and Hinduja Global, all the other companies value show that they are significant. R-squared value indicates that every independent variable (Ten software companies) illuminates 59.6351% of the deviation from the dependent variable BSE Index. Among the three criterions: Akaike Info Criterion (AIC), Schwarz Criterion, Hannan-Quinn Criterion, AIC is best suitable method as it has the lowest value of 14.83753. Durbin-Watson stat is used to identify the existence of autocorrelation between residuals. The standards should lie between 0 and 4 where a value approaching the least value is positive and the higher value indicates negative autocorrelation. Here the value is approaching towards 0.594978 which means there is a positive autocorrelation between the past and present relationship between independent and dependent variables.

Dependent Variable: INDEX_VALUE
 Method: Least Squares
 Date: 06/12/17 Time: 13:05
 Sample (adjusted): 1 134
 Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
WIPRO	12.08442	4.621919	2.614590	0.0100
HCL	0.279723	2.901922	0.096392	0.9234
TCS	-2.159163	0.813211	-2.655109	0.0090
ORACLE	1.010953	0.426780	2.368790	0.0194
L__T	-16.22651	2.719654	-5.966388	0.0000
TECH_MAHINDRA	-8.526275	2.233088	-3.818153	0.0002
INFOSYS	8.302691	2.116115	3.923553	0.0001
MINDTREE	12.05465	3.031874	3.975972	0.0001
HINDUJA_GLOBAL	-2.929967	2.667180	-1.098526	0.2741
HINDUJA_VENTURE	19.49400	1.946791	10.01340	0.0000
R-squared	0.596351	Mean dependent var		11727.51
Adjusted R-squared	0.567054	S.D. dependent var		591.4331
S.E. of regression	389.1549	Akaike info criterion		14.83753
Sum squared resid	18778747	Schwarz criterion		15.05378
Log likelihood	-984.1143	Hannan-Quinn criter.		14.92541
Durbin-Watson stat	0.594978			

Correlation

Correlation											
	INDEX_VALUE	WIPRO	HCL	TCS	ORACLE	L_T	TECH_MAHIL	INFOSYS	MINDTREE	HINDUJA_G	HINDUJA_V
INDEX_VALUE	1.000000	-0.127154	-0.515612	-0.151727	-0.330421	-0.687712	-0.787580	0.227562	-0.208730	-0.255593	-0.058595
WIPRO	-0.127154	1.000000	0.799065	0.775964	0.758229	0.627349	0.112693	0.579203	0.137889	0.638188	0.084307
HCL	-0.515612	0.799065	1.000000	0.682610	0.716445	0.750623	0.502281	0.471353	0.348045	0.590625	-0.030281
TCS	-0.151727	0.775964	0.682610	1.000000	0.741310	0.562011	0.239706	0.747122	0.168211	0.783220	0.131569
ORACLE	-0.330421	0.758229	0.716445	0.741310	1.000000	0.760729	0.272609	0.349765	-0.165047	0.885740	0.203194
L_T	-0.687712	0.627349	0.750623	0.562011	0.760729	1.000000	0.573753	0.146789	0.101720	0.618776	0.342018
TECH_MAHIL	-0.787580	0.112693	0.502281	0.239706	0.272609	0.573753	1.000000	0.066031	0.367324	0.278934	0.107543
INFOSYS	0.227562	0.579203	0.471353	0.747122	0.349765	0.146789	0.066031	1.000000	0.406274	0.469184	-0.052569
MINDTREE	-0.208730	0.137889	0.348045	0.168211	-0.165047	0.101720	0.367324	0.406274	1.000000	-0.181669	-0.462792
HINDUJA_G	-0.255593	0.638188	0.590625	0.783220	0.885740	0.618776	0.278934	0.469184	-0.181669	1.000000	0.300607
HINDUJA_V	-0.058595	0.084307	-0.030281	0.131569	0.203194	0.342018	0.107543	-0.052569	-0.462792	0.300607	1.000000

Interpretation

Correlation helps us in identifying the trend in which the organizations move with the market (BSE Index). From the analysis it can be concluded that at the time of demonetization the only company that has positive correlation with the market is Infosys, where has all the other companies tend to move in negative/ opposite direction of the market (BSE).

Time - Series Analysis (ARCH Model)

	INDEX_VALUE	WIPRO	HCL	TCS	ORACLE	L_T	TECH_MAHIL	INFOSYS	MINDTREE	HINDUJA_G	HINDUJA_V
Mean	11727.51	475.3075	821.5082	2341.760	3388.225	668.1578	464.2821	987.2459	469.6601	555.7067	510.3515
Median	11814.65	474.7500	826.3250	2345.500	3266.250	678.7750	470.0250	990.9500	469.8000	546.9750	509.9500
Maximum	12809.11	515.7500	876.0500	2562.350	3944.000	720.2500	507.7000	1052.050	526.3500	621.2500	582.4500
Minimum	10633.98	437.1000	759.1500	2105.050	2842.750	596.7500	407.4000	911.1500	423.9000	485.0000	452.0500
Std. Dev.	591.4331	18.80932	29.44172	106.4569	299.9993	34.94611	25.86117	36.16964	22.28929	36.52150	22.90309
Skewness	0.019435	0.273595	-0.373370	-0.207850	0.402585	-0.438302	-0.301500	-0.292040	0.254005	0.166573	-0.281807
Kurtosis	1.909760	2.360143	2.450107	2.330826	1.718540	1.956209	2.005507	2.083192	2.705159	1.848339	4.486550
Jarque-Bera	6.644916	3.957648	4.801677	3.465018	12.78828	10.37347	7.552155	6.597741	1.926286	8.024977	14.11183
Probability	0.036064	0.138232	0.090642	0.176840	0.001671	0.005590	0.022912	0.036925	0.381691	0.018088	0.000862
Sum	1571486.	63691.20	110082.1	313795.9	454022.1	89533.15	62213.80	132290.9	62934.45	74464.70	68387.10
Sum Sq. Dev.	46522483	47054.13	115286.4	1507299.	11969941	162423.7	88950.39	173996.3	66076.08	177398.0	69765.34
Observations	134	134	134	134	134	134	134	134	134	134	134

Interpretation

There are 134 observations of BSE Sensex index from 03-10-2016 to 18-04-2017 of all ten software companies. The mean BSE Sensex Index is more for Oracle from 03-10-2016 to 18-04-2017 and the least is Tech Mahindra. The median BSE Sensex Index is more for Oracle from 03-10-2016 to 18-04-2017 and the least is for Mindtree. The standard deviation BSE Sensex Index is more for Oracle from 03-10-2016 to 18-04-2017 and the least for Wipro. The skewness is more for Oracle from 03-10-2016 to 18-04-2017 and the least is for L&T (negative value). The Kurtosis for all the thirty software companies is greater than zero. This implies that the data heavy tailed and there

is a random variance. The p-value of JarqueBera Test is less than 0.05, indicates data is normally distributed. We could say as if the probability value is less than 0.05, then the data is significant, i.e. it's a normal data and it can be considered for further process and if its above 0.05 it's vice versa. From the above data, it can be said that the p-value of all the ten companies are above 0.05, this implies the data is not significant. Sum of squared deviations should be low for a better fit. Wipro has a low sum of squared deviations which means it varies from the mean value.

Garch

The Analysis is as follows:

Dependent Variable: INDEX_VALUE
 Method: ML - ARCH (Marquardt) - Normal distribution
 Date: 06/12/17 Time: 13:08
 Sample (adjusted): 1 134
 Included observations: 134 after adjustments
 Failure to improve Likelihood after 45 iterations
 Presample variance: backcast (parameter = 0.7)
 GARCH = C(11) + C(12)*RESID(-1)^2 + C(13)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
WIPRO	0.091309	4.656213	0.019610	0.9844
HCL	5.114812	3.016131	1.695819	0.0899
TCS	-1.337562	0.856964	-1.560814	0.1186
ORACLE	0.221926	0.432629	0.512971	0.6080
L__T	-13.81624	2.859052	-4.832456	0.0000
TECH_MAHINDRA	-7.468396	2.307016	-3.237254	0.0012
INFOSYS	11.56459	2.350783	4.919462	0.0000
MINDTREE	6.264539	3.130667	2.001024	0.0454
INDUJA_GLOBAL	0.017086	2.458602	0.006949	0.9945
INDUJA_VENTURE	15.82628	1.968979	8.037807	0.0000

Variance Equation				
C				
C	89547.77	36471.67	2.455270	0.0141
RESID(-1)^2	0.657665	0.301161	2.183766	0.0290
GARCH(-1)	-0.227163	0.242668	-0.936109	0.3492

R-squared	0.478707	Mean dependent var	11727.51
Adjusted R-squared	0.440871	S.D. dependent var	591.4331
S.E. of regression	442.2435	Akaike info criterion	14.53721
Sum squared resid	24251838	Schwarz criterion	14.81835
Log likelihood	-960.9934	Hannan-Quinn criter.	14.65146
Durbin-Watson stat	0.358448		

Interpretation

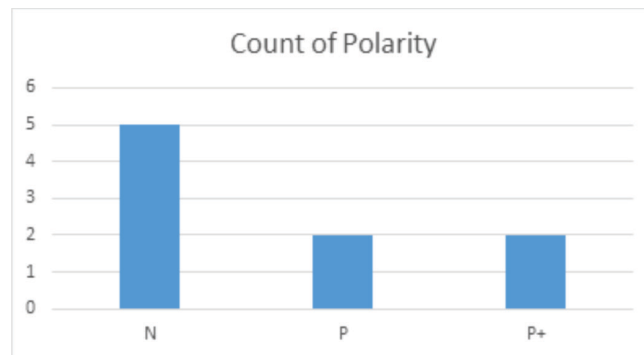
The dependent variable for this test is BSE Index. R-squared value of 0.478707 indicates that every independent variable (top ten software companies) illuminates 47.8707% of the deviation from the dependent variable BSE Index. Adjusted R-squared value of 0.440871 indicate that the variable which has strong correlation like 44.0871% of the total variation in BSE Sensex Index. Durbin-Watson, the value is approaching towards 0.358448 which means there is a positive autocorrelation between the past and present relationship among the variables (independent and

dependent, as the value lies between 0 - 4). Among the three criteria: Akaike Info Criterion (AIC), Schwarz Criterion, Hannan-Quinn Criterion, AIC is most suitable method as it has the lowest value of 14.53721.

Sentimental Analysis

Oracle

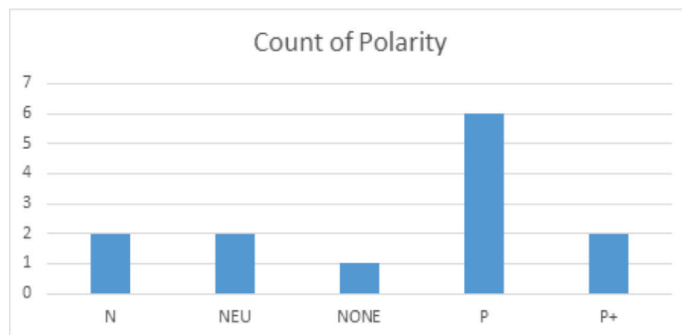
Polarity	Count of Polarity	% level
N	5	55.6
P	2	22.2
P+	2	22.2
Total	9	100



The count of polarity is more for N which takes 55.6% and the least P and P+ takes 22.2% individually.

TCS

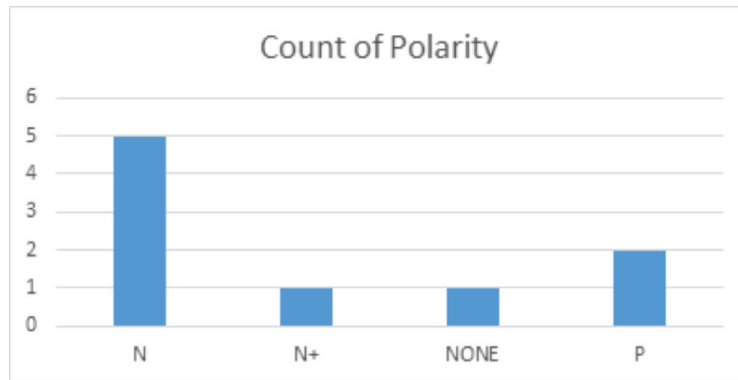
Polarity	Count of Polarity	% Level
N	2	15.4
NEU	2	15.4
NONE	1	7.7
P	6	46.2
P+	2	15.4
Total	13	100



The count of polarity is more for P which takes 46.2% and the least is for None that takes 7.7%, whereas N, NEU, P+ takes 15.4% individually.

Wipro

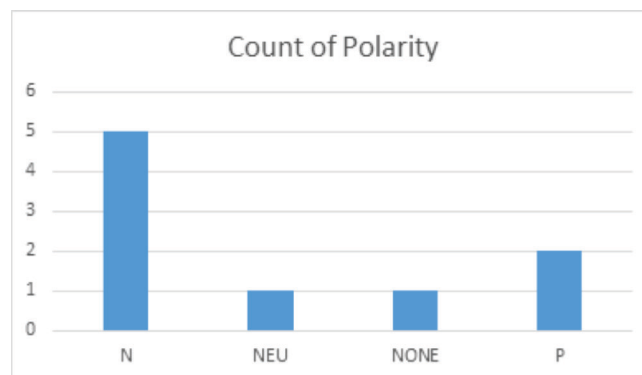
Polarity	Count of Polarity	% level
N	5	55.6
N+	1	11.1
NONE	1	11.1
P	2	22.2
Total	9	100.0



The count of polarity is more for N which takes 55.6% and the least is for None and N+ saying 11.1% individually, whereas P takes 22.2%.

L & T

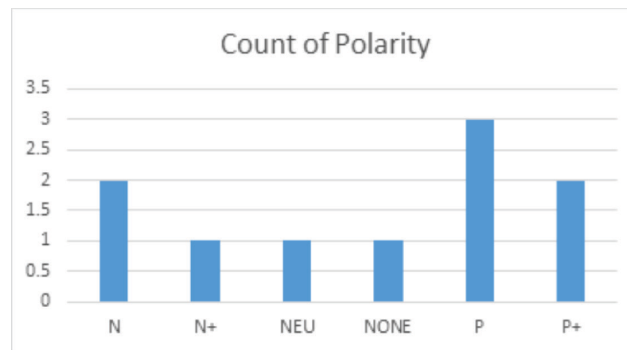
Polarity	Count of Polarity	% level
N	5	55.6
NEU	1	11.1
NONE	1	11.1
P	2	22.2
Total	9	100.0



The count of polarity is more for N which takes 55.6% and the least is for None and NEU saying 11.1% individually, whereas P takes 22.2%.

Infosys

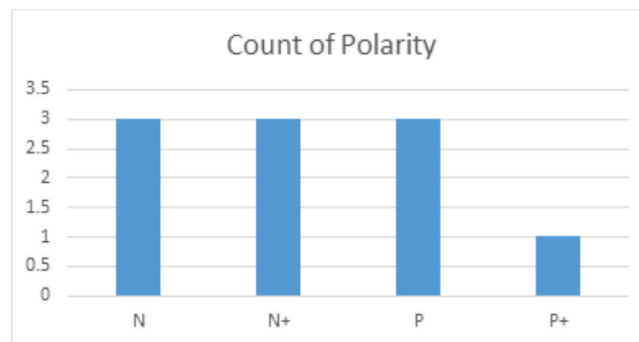
Polarity	Count of Polarity	% level
N	2	20
N+	1	10
NEU	1	10
NONE	1	10
P	3	30
P+	2	20
Total	10	100



The count of polarity is more for P which takes 30% and the least is for N+, None and NEU saying 11.1% individually, whereas P+ and N takes 22.2% individually.

Tech Mahindra

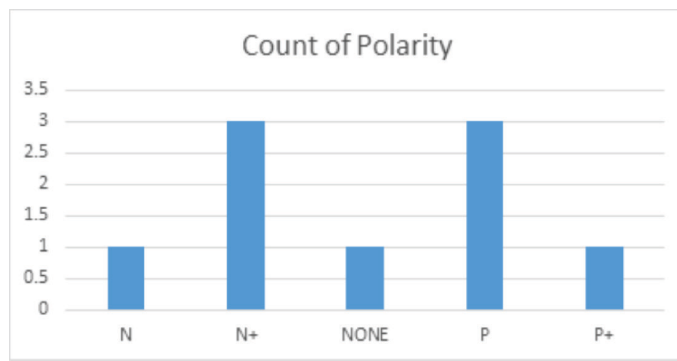
Polarity	Count of Polarity	% level
N	3	30
N+	3	30
P	3	30
P+	1	10
Total	10	100



The count of polarity is more for P, N and N+ which takes 30% individually and the least is for P saying 10%.

HCL

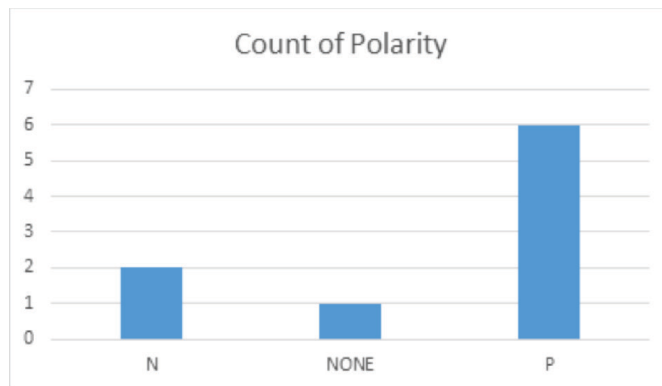
Polarity	Count of Polarity	% level
N	1	11.1
N+	3	33.3
NONE	1	11.1
P	3	33.3
P+	1	11.1
Total	9	100.0



The count of polarity is more for P and N+ which takes 33.3% individually and the least is for P+, NONE and N saying 11.1% individually.

Mindtree

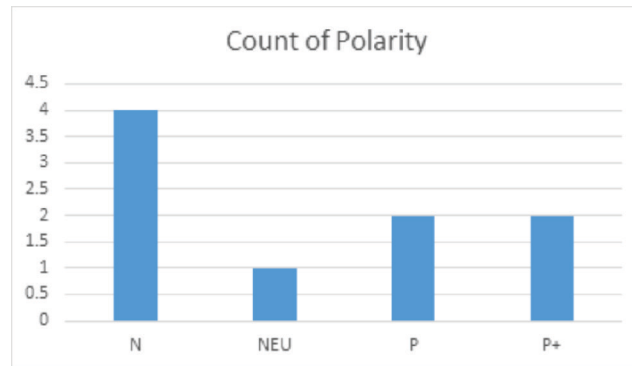
Polarity	Count of Polarity	% level
N	2	22.2
NONE	1	11.1
P	6	66.6
Total	9	100



The count of polarity is more for P which takes 66.6% and the least is for NONE saying 11.1% and N takes the value of 22.2%.

Hinduja Global

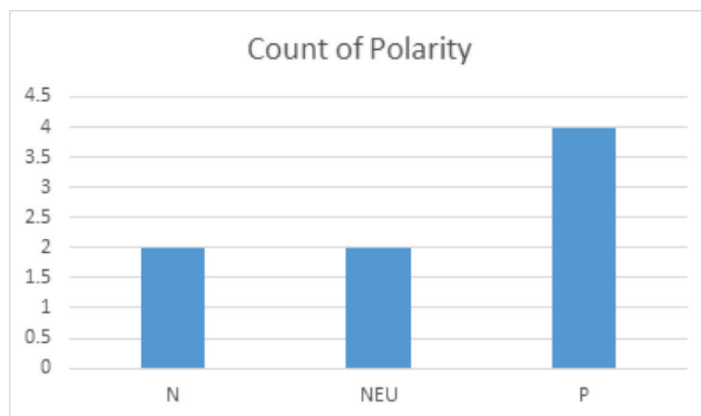
Polarity	Count of Polarity	% level
N	4	44.4
NEU	1	11.1
P	2	22.2
P+	2	22.2
Total	9	100



The count of polarity is more for N which takes 44.4% and the least is for NONE saying 11.1% and P and P+ takes the value of 22.2% individually.

Hinduja Venture

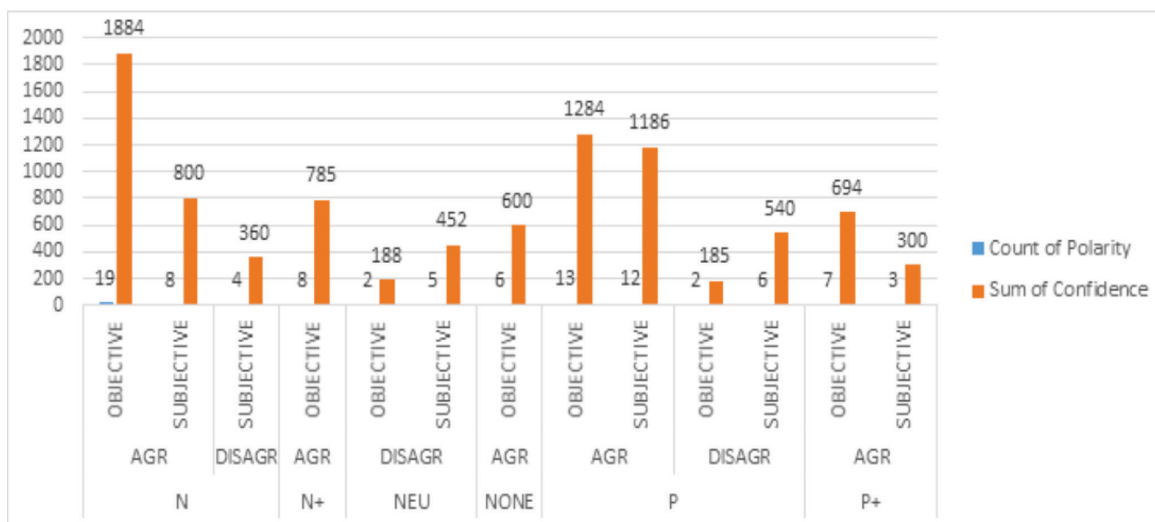
Polarity	Count of Polarity	% level
N	2	25
NEU	2	25
P	4	50
Total	8	100



The count of polarity is more for P which takes 50% and the least is for N and NEU saying 25% individually.

Overall Count of Polarity and Sum of Confidence

Polarity	Agreement	Subjectivity	Count of Polarity	Sum of Confidence	% Level of Polarity	% Level of confidence
N	AGR	OBJECTIVE	19	1884	20.0	20.3499676
N	AGR	SUBJECTIVE	8	800	8.4	8.6411752
N	DISAGR	SUBJECTIVE	4	360	4.2	3.88852884
N+	AGR	OBJECTIVE	8	785	8.4	8.47915316
NEU	DISAGR	OBJECTIVE	2	188	2.1	2.03067617
NEU	DISAGR	SUBJECTIVE	5	452	5.3	4.88226399
NONE	AGR	OBJECTIVE	6	600	6.3	6.4808814
P	AGR	OBJECTIVE	13	1284	13.7	13.8690862
P	AGR	SUBJECTIVE	12	1186	12.6	12.8105422
P	DISAGR	OBJECTIVE	2	185	2.1	1.99827176
P	DISAGR	SUBJECTIVE	6	540	6.3	5.83279326
P+	AGR	OBJECTIVE	7	694	7.4	7.49621949
P+	AGR	SUBJECTIVE	3	300	3.2	3.2404407
Total	95	9258	100	100		



Conclusion

The impact of demonetization on the IT sector could be clearly seen with the help of the ten software companies listed in BSE Sensex, and we could also see the impact was less and even the software industry started to reshape itself in short span of time (says in a week). Oracle is the only software company among the chosen bunch that shows no impact of demonetization. So, it can be concluded from the observations that the market was very volatile in the initial stage of announcement of demonetization, being an unexpected event. Though the hit was very big, the IT industry wrapped up quickly with required measures and started to boom-up, even from the

analysis it can be seen that some companies are still lagging in progress yet they show minor improvement when compared to their previous day returns (even when the values are negative), showing that impact of demonetization on IT sector is not despicable as expected.

Limitations and Future Directions

The study was constrained with only ten software companies due to the unavailability of investors and individuals' views and comments from the social medias like Twitter and Facebook for the industry as a whole. Further research can be conducted based on a particular industry or sector, on an index or can be carried out as a comparative study between different sectors and index and even a comparative study of different exchanges with Indian stock market. Capturing investors sentiment other than from social media can also be considered for future study. Nifty 50 can be considered instead of BSE Sensex for bringing further improvement to the study, a study can also be analyzed to capture the variation between the two indexes of India, BSE and Nifty. In this study, the event considered is "Demonetization", where this can be replaced with other events like impact of budget implications, Implementation of GST in to the economy and various other events that has happened before and after the actual event ts considered for this study. The analysis methods used to measure the stock returns can also be widened. Finally, the most important is the sampling size of the work which can be increased in terms of class in order to increase the accuracy of the outcome for comparative subject.

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