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# Weekend Effect: A Case Study on NIFTY 50

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**Structured Abstract:**

**Purpose:** The purpose of the present paper is to find the existence of Weekend Effect in National Stock Exchange's leading index, NIFTY 50.

**Design:** The data of a reasonably long period from 1st February 2006 to 31st December 2015 is studied. Two different hypotheses are formed here in order to study the effect. Statistical tests like ANOVA and Dummy Variable Regression are done.

**Findings:** Results of ANOVA implied that the Monday returns are not different from the returns of the other days of the week on an average. It is also found using the regression that the Monday returns are not significant, and as a whole the difference between the Monday returns and the returns of the other days of the week are statistically insignificant.

**Value:** This study will be helpful to the investors and companies to understand the nature of the Weekend Effect in NIFTY 50 index.

**Keywords:** Weekend Effect, National Stock Exchange, NIFTY 50, Dummy Variable Regression.

**Paper Type:** Original Research.

## Introduction

Weekend Effect is an anomaly to the Efficient Market Hypothesis. Many times it is tried to study that if there is any way to forecast the profit, or if there is a way to forecast the loss? In this connection, various theories and models are there to describe investors' activities and opportunities to the market. One most important theory in this regard is the Efficient Market Hypothesis, which is worldwide accepted as a basis of how the investors can obtain the benefit of the market based on any sort of information available to them.

There are various forms of efficiencies based on what is the information available to the investor. As per weak form efficiency, it is said that the investor will not be able to rip any benefit from the market based on the historical data (Malkiel, 1973). That means, trend

analysis will not be able to predict the future return of the market, anyhow. As per the semi-strong form efficiency, neither the fundamental analysis nor the technical analysis will be able to determine or predict any sort of excess return in future. No publicly available information will be any good to predict excess return. As per the strong form efficiency, any information, whether it is a publicly available one or a private one, will not be able to achieve excess return in the market. No wonder that the hypothesis is highly accepted globally, from May 1970, when Fama (1970) published the article "Efficient Capital Markets: A Review of Theory and Empirical Work" in the "Journal of Finance". When the paper was published in the Journal of Finance, it was considered as a ground-cracking one; and Fama was considered as the pioneer of this revolutionary concept. Evidently, it is accepted worldwide as an outstanding achievement, and a lot of further researches was pioneered by this this concept.

There are many observed market movements that are not explained by the arguments of the efficient market hypothesis. In the standard finance theory, such market movements that are inconsistent with the efficient market hypothesis are called anomalies. According to Tversky and Kahneman (1986) "an anomaly is a deviation from the presently accepted paradigms that is too widespread to be ignored, too systematic to be dismissed as random error and too fundamental to be accommodated by relaxing the normative system". While in standard finance theory, financial market anomaly means a situation in which a performance of stock or a group of stocks deviate from the assumptions of efficient market hypotheses. Such movements or events which cannot be explained by using efficient market hypothesis are called financial market anomalies. In financial markets, anomalies refer to situations when a security or group of securities performs contrary to the notion of efficient markets, where security prices are said to reflect all available information at any point in time(Silver, 2011).For the sake of convenience, Anomalies can be divided into three basic types. These are (i). Fundamental anomalies; (ii). Technical anomalies; and (iii). Calendar or seasonal anomalies.

The most important studies relating to that area are the studies of calendar or seasonal anomalies that mean if there is a seasonal pattern in the return earning stream. Calendar anomalies are related with particular time period i.e., movement in stock prices from day to day, month to month, year to year, etc. These include Weekend Effect, Day-of-the-week effect, Turn-of-the-month Effect, Turn-of-the-year Effect, etc.

The weekend effect, which is the stock prices are likely to fall on Monday, means the closing price of Monday is less than the closing price of previous Friday, is thought to be one of the

most important anomalies. Theoretically a weekend effect is the comparison between the Fridays's closing return with the next Monday's opening return. It is generally found that the Monday returns are significantly lower than those of the Friday's returns, and this is termed as Weekend effect, or the Monday effect. Over a long time, the Weekend Effect is reported as an anomaly, in all the corners of the world. Moreover, over the last two decades, it is also found that in some countries of the world the Weekend Effects started to disappear, or even it got reversed, i.e. Monday returns started to be higher than previous Friday's returns.

**Objective of the Study**

The objective of the present paper is to search for the nature of weekend effect in the prime stock index of India, that is NIFTY 50. Weekend effect, as stated earlier, is one of the most important anomalies prevailing in the stock markets worldwide. In most of the countries it was reported to exist, up to the end of the last century.

India, being a very important country in world economy, and having a number of highly active stock exchanges, also claims to be studied in those grounds. In Indian prime stock exchange NSE, there are a huge number of investors active, buying and selling securities every day. There are also market experts who try to discover if there is a seasonal pattern in the securities return structure.

So, as a whole, there is some valid ground of study of such an anomaly in Indian context; if the Weekend Effect exists in India or not.

**Literature Review**

Weekend effect was first found to exist in early 1920. It was found by the practitioners, without any use of electronic database. A few important studies of that era are Kelly (1930), Fields (1931), and Cross (1973). The first study using the statistical methods was conducted by French (1980), who stated that the weekend effect exists. A number of academic research were conducted to judge whether it exists or not; why this seasonal pattern of fluctuation in returns do take place; and is the characteristics of the seasonal pattern remains the same over the year or if there is any dimensional change over the passage of time and incorporation of new dimensions in the securities market.

The first work using the sophisticated statistical techniques was conducted by French (1980). He studied S&P 500 index over the period 1953 to 1977. One important part of his tests was the test for Trading Time and Calendar Time Hypothesis; where he used the OLS Regression techniques using the dummy variables for the days of the week for the first time. He found that the Monday returns are significantly negative, that is less than zero; while the mean returns for the other days are significantly greater than zero. So he concluded that the weekend effect exists.

Gibbons and Hess (1981) studied the S&P 500 index as well as CRSP value and equally weighted index for NYSE and AMEX securities from 1962 to 1978. They found that the return pattern is not equal for all the days of a week; and Mondays are most unusual. This scenario was not for any individual security, but all the 30 securities included in DJIA showed a negative mean return on Mondays.

Lakonishok and Levi (1982) studied the settlement effect again, given emphasis on cheque clearing procedure. They collected the data from Center for Research in Security Prices (CRSP) of the University of Chicago, which covered the period from July 1962 to December 1979. They studied that the stock buyers are more intended to buy stocks on Friday than the other days of the week, because for Friday, they have ten colander days in their hand for the payment of their purchase whereas for any other days, they have six colander days to payment for their purchase. This makes the Friday prices abnormally high, and eventually the Monday price becomes negative compared with it.

Rogalski (1984) studied the opening and closing prices of the stocks from DJIA from 1st October 1974 to 30th April 1984 along with S&P 500 index for the period 29th December 1978 to 9th December 1983. It was found by him that the Monday returns are substantially negative for that period for both the indexes. The magnitude of the negative Monday return is greater than the average Monday return, so it makes it negative as a whole.

Jaffe and Westerfield (1985) searched for the international evidence of the weekend effect on the common stock return. They studied the daily stock returns of US, UK, Japan, Canada and Australia. They found the weekend effect in all of the countries, but in Japan and Australia, the lowest stock return occurs on Tuesday. They found no evidence of measurement error or settlement procedure to take a role in this weekend effect.

Lakonishok and Smidt (1988) studied the DJIA for a 90 years long period from 1896 to 1986. The 90 years' total period was subdivided into two major periods and seven non overlapping

sub periods. They used the OLS Regression using dummy variables, and conducted F test to joint significance of the coefficients of the regression. They found that he null hypothesis that all the day's returns are equal is reject able.

Lakonishok and Maberly (1990) documented regularity in the trading patterns of the individual and institutional investors in relation to the days of a week. They used the NYSE trading volume (the number of shares) and the daily odd lot transactions (no of shares), covering a period from 1962 to 1983. They broke the entire 25 years to five non-overlapping five-year sub periods. They found a decrease of more than 10% of trading volume in Mondays, and it is significantly different from the trading volumes of the other days of the week. So, for Mondays, the null hypothesis that the mean trading volume is the same is reject able, but for the rest days of the week, the null hypothesis stood good.

Abraham and Ikenberry (1994) studied the mean daily returns to the CRSP equal-weight index of NYSE and ASE firms by weekdays are examined over the period 1963 to 1991. To measure the trading activities of the individuals, they examine odd-lot purchase and sale trading volume of NYSE stock. They found that when Friday returns are negative, nearly 80% Monday returns are negative. But if Friday returns are positive, more than half of the following Monday returns are positive.

Maria Rosa Borges (2009) examines day of the week and month of the year effects in seventeen European stock market indexes. She collected daily data on seventeen Western and Central European stock market indexes, for the period beginning in January, 1994 through to December, 2007. She used ARCH models, mainly GARCH (1, 1) in order to correct the variability in the variance of the residuals. The conclusion was the European countries seem to be mostly immune to day of the week effects, even though the group of seventeen countries, taken together, does tend to show higher daily returns on Thursdays and Fridays, and lower in Mondays in Tuesdays.

Moreover, Tong (2000), Kim (1988), Wang, Li, and Erickson (1997), Rahaman (2009), Singleton and Wingender (1994) etc. all reported the same pattern of existence of Monday effect.

Some studies were conducted in India and the subcontinent, too. Poshakwale (1996)studied the efficiency of Indian capital market along with the existence of the day of the week effect. He studied the daily prices of the Bombay Stock Exchange National Index (BSENI) from 2nd

January 1987 to 31st October, 1994. He found that the mean returns except for the Monday and Wednesday are positive.

Rahaman (2009) examined the presence of day of the week effect anomaly in Dhaka Stock Exchange (DSE) of Bangladesh. The data he used in the study is the daily closing prices of DSE indices such as DSE all share prices index (DSI), DSE general index (DGEN) and DSE 20 index DSE 20) for a period from 04.09.2005 to 08.10.2008. Other than using descriptive statistical tests and ANOVA, the OLS regression model is also employed in his test. Moreover, he provided the use of GARCH (1, 1) model for the adjustment of heteroscedasticity in the data to test the volatility of the return. They found that the weekend effect exists in the Dhaka Stock Exchange.

Haroon and Shah (2013) investigated Day-of-the-Week Effect in stock returns in the primary equity market Karachi Stock Exchange (KSE) of Pakistan. The data they tested comprises of daily closing price of KSE-100 index from January 01, 2004 to December 30, 2011 which was divided into two sub-periods. They employed the traditional OLS regression approach to study. But instead of using one single equation, they used 5 different OLS Regression equations for 5 days of week, inspired by Borges (2009). The study found mixed results for both Sub Periods. Sub Period I (2004–2007) negates the prevalence of Day-of-the-Week Effect due to political instability. Moreover, study evidenced the presence of Day-of-the-Week Effect in Sub Period II. And the argument to support this result might be that the period after election in 2008–2011 comprised of democracy and political stability in terms of government and fairly consistent policies.

Pathak (2013) in his study observes that day of the week effect and month of the year effect is not noticed in Indian stock market due to the increased volatility, increased awareness among Indian investors, globalization of Indian economy, reach of media, emergence of derivatives segment and increase in disposable income.

Neeraja and Srikanth (2014) studied the anomalies present in the Indian Information Technology companies stocks and also study the impact of overall Indian stock market conditions on the Information technology company's stocks. The result indicates of Augmented Dickey Fuller test that returns of Indian IT sector stocks are more volatile than the overall Indian stock market. GARCH model disclose that negative returns are observed in IT better during the month of March and April. Similar trend is noticed in BSE during the month of January, July and August.

## Research Methodology

**Data:** The index data that is taken into present study is NIFTY 50. The daily stock indices are collected using the CMIE Prowess database, provided by Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE), which is said to be India's leading business and economic database. Daily returns are calculated from daily price data using the formula of logarithmic return –

$$\boldsymbol{R_t = ln(P_t/P_{t-1})}$$

Where $R_t$ is the return of day t; $P_t$ is the price of day t and $P_{t-1}$is the price of the just previous day of day t.

**Period:** The time taken under study is from 1st February 2006 to 31st December 2015. The reason behind choosing the period is that it is not only a reasonably long and contemporary time frame, but also it takes a complete economic cycle into consideration; as it includes the time of global economic crisis, the time previous to it, and the time following it.

**Model and Hypothesis:** The following hypothesis are formulated and tested:

***Hypothesis I:*** The model employed in this study tests the hypothesis of equal mean returns for each trading day of the week. The specific hypothesis tested is:

**H0:** The average daily return of every working day of the week is statistically equal

**H1:** The average daily return of every working day of the week is statistically different

That is H0: μ1= μ2= μ3= μ4= μ5 against the alternative μ1≠ μ2≠ μ3≠ μ4≠ μ5

Where

- μ1= Average Monday return
- μ2= Average Tuesday return
- μ3= Average Wednesday return
- μ4= Average Thursday return
- μ5= Average Friday return

Rejection of the null hypothesis implies that at least one of the five daily rates of return is not equal to the others.

To test the null hypothesis that all the population means are equal against the alternative hypothesis that at least one mean is different, the test model that is applied is One Way

Analysis of Variance (ANOVA). It is the technique of test the equality of three or more means at one time by using variances. The basic assumptions of this test are:

- The populations from which the samples are drawn are normal or normal approximation is done.
- The samples are independent.
- The population variances are equal.

The F test statistic is calculated by dividing the between group variance by the within group variance. That is –

$$F = \frac{SS(B)}{df_B} / \frac{SS(W)}{df_W}$$

Where SS(B) is the variation between groups. It is calculated as

$$SS(B) = n_1(\overline{x_1} - \bar{x})^2 + n_2(\overline{x_2} - \bar{x})^2 + \cdots \ldots\ldots\ldots\ldots\ldots + n_n(\overline{x_n} - \bar{x})^2$$

And SS(W) is the variation within groups. It is calculated as

$$SS(W) = (n_1 - 1)SD_1^2 + (n_2 - 1)SD_2^2 + \cdots \ldots\ldots\ldots\ldots + (n_{1n} - 1)SD_n^2$$

Where

- $n_1, n_2, \ldots, n_n$ are the sample size of every working day from Monday to Friday,
- $\overline{x_1}$, $\overline{x_2}$,……, $\overline{x_n}$ are the sample means of every working day from Monday to Friday,
- $SD_1^2$, $SD_2^2$, …….. $SD_n^2$ are standard deviations of returns of each working day from Monday to Thursday,
- $df_B$ is the degree of freedom between group
- $df_W$ is the degree of freedom within group, and
- $\overline{x_1}$ is the population mean.

**Decision Rule:** The decision will be to reject the null hypothesis if the calculated value of the test statistic F is greater than the F critical value with k-1 numerator and N-k denominator degrees of freedom.

If the decision is to reject the null, then at least one of the means is different. However, the ANOVA does not tell where the difference lies. For this, the Tukey HSDtest is to be performed.

***Hypothesis II*:** In the next part, the test is done as to whether the Monday effect exists or not, we frame the null hypothesis that is -

**H0:** Monday return is significantly smaller than the average return for the rest of the week

Against the alternative hypothesis –

**H1:** There is no significant difference between the returns of the weekdays.

In order to test this hypothesis, the following OLS regression is applied:

$$R_t = \alpha + \beta_1 D_{1t} + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + \varepsilon_t$$

Where

- $R_t$ = Return of day t
- $\alpha$, the intercept represents the mean daily return for Monday.
- $D_{1t}$, $D_{2t}$, $D_{3t}$, and $D_{4t}$ are the dummy variables representing the weekdays from Tuesday to Friday defined as:
    - $D_{1t}$, the dummy for Tuesday, 1 on Tuesday and zero elsewhere.
    - $D_{2t}$, the dummy for Wednesday, 1 on Wednesday and zero elsewhere.
    - $D_{3t}$, the dummy for Thursday, 1 on Thursday and zero elsewhere.
    - $D_{4t}$, the dummy for Friday, 1 on Friday and zero elsewhere.
- $\beta_1$,$\beta_2$, $\beta_3$, and $\beta_4$, the coefficients of the dummy variables measures the difference between Monday's mean return and that day's mean return.
- $\varepsilon_t$, the error term for day t is the robust standard error.

**Analysis and Results**

The descriptive statistics of the whole period under observation is presented in Table 1. In Table 1 we find the descriptive statistics of return for the entire sample period. Here the values of Skewness and Kurtosis draw our attention instantly. From the value of skewness which is -0.353, we can say that the distribution is negatively skewed; that is, it the data is tailed towards the smaller values of the distribution. At the same time, the value of kurtosis, which is 7.084, indicates that the distribution is leptokurtic. It gives a hint of abnormality of the return distribution. So it seemed required to perform a test of normality.

So the Kolmogorov-Smirnov test of normality is applied. In Figure 1, we get the histogram of the return distribution. Based on the histogram, we can see that the errors may be normally distributed, but depending the value of Skewness and Kurtosis, the conclusion should be that

there is a lack of normality. Table 2 represents the results of the non-parametric Kolmogorov-Smirnov Goodness of Fit test.

The probability of Kolmogorov-Smirnov Z statistic at 5% level of significance confirms that there is abnormality in the return stream.

Table 3 represents the ANOVA table. We can see that the significance value (which is usually denoted as p value) is .659 as per the table, which is more than the level of significance, 0.05. So based on the Table 3 we cannot reject our Hypothesis 1, that is there is equality in mean returns for each trading day of the week. But, ANOVA itself does not point out the source of the difference, and for it we need to perform Tukey HSD test.

From Table 4 we can see that the Monday returns are not significantly different from the Thursday returns. At the same time, the Monday returns are not any special among the days of the week. Figure 2 displays the picture nicely.

This observation does not go with what is earlier found by French, Gibbons and Hess (1981), Lakonishok and Levi (1982), Rogalski (1984), and the others.

Table 5 below is the results of the OLS regression. From the table it is appearing that the intercept, which represents the value of Monday, is negative, but not statistically significant as its corresponding p value is 0.957. So based on the OLS regression we cannot say that the Monday returns are significantly smaller than the returns of other days of the week. These results are consistent with the previous test, too.

**Conclusion**

In this current paper we tried to search for the existence of Weekend Effect in NIFTY50 Index. We adopted ANOVA and Dummy Variable Regression techniques for this purpose. From the ANOVA test, we found that the returns of the days of the week are not statistically different. There is no significant difference among the returns of the days of the week. A further Post Hoc test Using Tukey HSD also does not show any significant difference between the Monday returns and the returns of the other weekdays, and the Means plot showed it clearly that Monday returns are not any special. So our findings are contradictory with the previous works, not showing the smallest Monday returns, which is a necessary criterion for the existence of the weekend effect.

The OLS Regression using dummy variables pointed it clearly that the Monday returns are statistically significant. Not only that, it is also shows that neither of the days of the week has any significant difference than the return of any other day of the week.

From the above results we may conclude that the weekend effect does exist in NIFTY 50.

These results may have very important practical implications to different market participants including investors, companies and regulatory authorities. Especially from the perspective of investors, these results may be of very much applicability. They can have an idea about the level of efficiency of National Stock Exchange and its leading index NIFTY 50 from it.

This study suffers from one weakness that it is based on the market index rather than individual stock's price. So there may be a chance that if it is judged based on the behaviour of a particular stock or a group of stocks, the findings may differ from the stated scenario, but for a portfolio that is well diversified among the stocks constituting the index, it is supposed to obtain the practical results closer to the study.

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## Tables:

### Table 1: Descriptive Statistics of daily return of the sample period

| Table: 1 – Descriptive Statistics of daily return of the sample period | | | |
|---|---|---|---|
| Sample Period | | From 1st February 2006 to 31st December 2015 | |
| Observations | | 2466 | |
| Minimum | | -.106226178 | |
| Maximum | | .136665745 | |
| Mean | | .00020295986 | |
| Standard Deviation | | .014604683646 | |
| Skewness | -.353 | Standard Error | .049 |
| Kurtosis | 7.084 | Standard Error | .099 |

### Table 2: Test of Normality

| Tests of Normality | | | | | | |
|---|---|---|---|---|---|---|
| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Return | .082 | 2466 | .000 | .930 | 2466 | .000 |
| a. Lilliefors Significance Correction | | | | | | |

### Table 3: ANOVA

| ANOVA | | | | | |
|---|---|---|---|---|---|
| **Return** | | | | | |
| | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| Between Groups | .001 | 4 | .000 | .605 | .659 |
| Within Groups | .525 | 2461 | .000 | | |
| Total | .526 | 2465 | | | |

### Table 4: Tukey HSD Post Hoc test

| Multiple Comparisons | | | | | | |
|---|---|---|---|---|---|---|
| **Dependent Variable: Return** | | | | | | |
| **Tukey HSD** | | | | | | |
| | | **Mean Difference** | | | **95% Confidence Interval** | |
| **(I) Days** | **(J) Days** | **(I-J)** | **Std. Error** | **Sig.** | **Lower Bound** | **Upper Bound** |
| Monday | Tuesday | .000009749185 | .000925366726 | 1.000 | -.00251631596 | .00253581433 |
| | Wednesday | -.000892654957 | .000926769140 | .872 | -.00342254841 | .00163723849 |
| | Thursday | .000336409737 | .000928662316 | .996 | -.00219865170 | .00287147118 |
| | Friday | -.000654703656 | .000932530725 | .956 | -.00320032508 | .00189091776 |
| Tuesday | Monday | -.000009749185 | .000925366726 | 1.000 | -.00253581433 | .00251631596 |
| | Wednesday | -.000902404143 | .000927232398 | .867 | -.00343356219 | .00162875391 |
| | Thursday | .000326660552 | .000929124629 | .997 | -.00220966291 | .00286298402 |
| | Friday | -.000664452842 | .000932991122 | .954 | -.00321133105 | .00188242537 |
| Wednesday | Monday | .000892654957 | .000926769140 | .872 | -.00163723849 | .00342254841 |
| | Tuesday | .000902404143 | .000927232398 | .867 | -.00162875391 | .00343356219 |
| | Thursday | .001229064695 | .000930521380 | .678 | -.00131107162 | .00376920101 |
| | Friday | .000237951301 | .000934382093 | .999 | -.00231272398 | .00278862658 |

| Multiple Comparisons | | | | | | |
|---|---|---|---|---|---|---|
| **Dependent Variable: Return** | | | | | | |
| **Tukey HSD** | | | | | | |
| | | **Mean Difference** | | | **95% Confidence Interval** | |
| **(I) Days** | **(J) Days** | **(I-J)** | **Std. Error** | **Sig.** | **Lower Bound** | **Upper Bound** |
| Thursday | Monday | -.000336409737 | .000928662316 | .996 | -.00287147118 | .00219865170 |
| | Tuesday | -.000326660552 | .000929124629 | .997 | -.00286298402 | .00220966291 |
| | Wednesday | -.001229064695 | .000930521380 | .678 | -.00376920101 | .00131107162 |
| | Friday | -.000991113394 | .000936259875 | .828 | -.00354691464 | .00156468786 |
| Friday | Monday | .000654703656 | .000932530725 | .956 | -.00189091776 | .00320032508 |
| | Tuesday | .000664452842 | .000932991122 | .954 | -.00188242537 | .00321133105 |
| | Wednesday | -.000237951301 | .000934382093 | .999 | -.00278862658 | .00231272398 |
| | Thursday | .000991113394 | .000936259875 | .828 | -.00156468786 | .00354691464 |

**Table 5: Results of OLS Regression**

| Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| | | **Unstandardized Coefficients** | | **Standardized Coefficients** | | |
| **Model** | | **B** | **Std. Error** | **Beta** | **t** | **Sig.** |
| 1 | (Constant) | -3.550E-5 | .001 | | -.054 | .957 |
| | Tuesday | -4.875E-6 | .000 | .000 | -.011 | .992 |
| | Wednesday | .000 | .000 | .024 | .963 | .336 |
| | Thursday | -8.410E-5 | .000 | -.009 | -.362 | .717 |
| | Friday | .000 | .000 | .018 | .702 | .483 |
| a. Dependent Variable: Return | | | | | | |

## Figures:

**Figure 1: Histogram of daily returns**

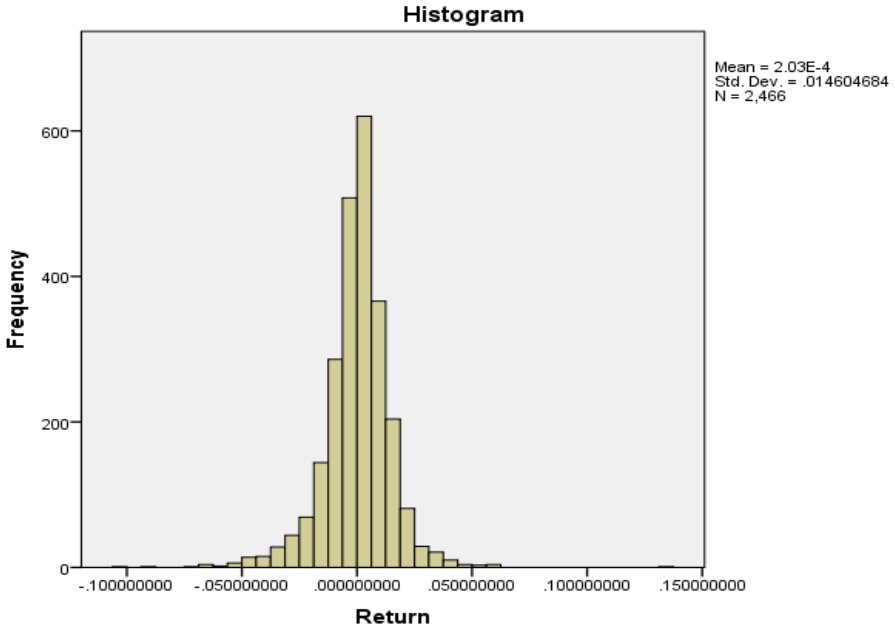


**Figure 2: Mean of returns**