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**Research Article**

# Anomalies in Indian Stock Market

Professor Chand Tandon
New Delhi Institute of Management
www.ndimdelhi.org

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**ABSTRACT**

The effect of market anomalies on different Stock Indices. Whether the Stock Indices are affected by the different effects like January Effect, March Effect and Day of the Weak Effect many more. Or there is an Arch-Garch Effect in the Stock Indices. With the data of different stock indices for last 10 years. We will find the Log Returns for all the Stock Indices. The next step would be to find the different effects in the Stock Indices. Then we will use Volatility models to find that whether the data has Arch-Garch and E-Garch Effect or not.

**KEYWORDS**: Anomalies , economical market, chart analysis, data handling

## LITERATURE REVIEW

In the 1970, the economical Market Hypothesis was established by Eugene Fama. The hypothesis seeks to clarify however market potency are often delineate and tested inside 3 categories: the weak-form potency, semi-strong potency, and strong-form potency. However, Fama describes AN economical security market as a market wherever costs absolutely replicate all on the market data. Moreover, Fama argues that costs in AN economical market ought to follow a stochastic process and therefore creating it not possible to predict future security costs exploitation solely historical security value knowledge.

The efficient-market hypothesis (EMH) is one in every of the foremost necessary economic and money hypotheses that are tested over the past century. Because of several abnormal phenomena and conflicting proof, otherwise referred to as anomalies against EMH, some lecturers have questioned whether or not EMH is valid, and got wind that the money literature has substantial proof of anomalies, so several theories are developed to clarify some anomalies. This review is helpful to lecturers for developing up-to-date treatments of monetary theory that EMH, anomalies, and behavioral Finance underlie. The review is additionally useful to investors for creating selections of investment merchandise and methods that suit their risk preferences and behavioral traits foreseen from behavioral models. Finally, when EMH, anomalies and behavioral Finance square measure wont to justify the impacts of capitalist behavior on stock value movements, it's priceless to policy manufacturers, once reviewing their policies, to avoid excessive fluctuations available markets.

The term 'Anomaly' are some things that doesn't follow a regular pattern or in alternative words, deviates from what's expected. Similarly, existence of anomalies has been evidenced within the money markets yet. Although several analysis are done keeping stress on the western exchange indices, this paper tries to check not solely the presence of market anomalies in context to the Indian stock exchanges, however conjointly study the anomalies in terms of the Foreign Stock Exchanges.. The day-of-the-week impact is one type of a seasonal anomaly and it's one in every of the foremost heavily investigated topics. Early studies, like Cross (1973) and French (1980), have shown that there exists a negative Mon impact, which means basically that mean returns on Mondays square measure negative.

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The existence of this impact contradicts to the EMH, suggesting that there ought to be no evident pattern of come back within the market. Moreover, this might provide investors an opening to earn positive risk-adjusted returns (RAR). More 10030dern studies, like Steeley (2001) and Kohers et al. (2004) suggests that the stock markets square measure a lot of economical these days, inflicting the day-of-the-week impact to slowly disappear.

Market anomalies, delineate as surprising value behaviour within the equity market are AN extensively studied field over the past forty years. Probably, investors might benefit of such mispricing so as to earn abnormal returns. Significantly, the group action prices and time variable exchange risk premiums got to be taken under consideration which can offset the potential gains from such a commerce strategy. Hence, a market that seems to be inefficient may very well be economical if one takes the group action prices and time-varying stock risk premiums under consideration. In capital markets, as well as the exchange, anomalies are often delineate as a deviation from the prediction in step with the economical Market Hypothesis.

Calendar impact is on the majorly proverbial anomalies within the money markets. The January impact is one in every of the anomalies, whereverin the stocks that typically performed weak within the finish of the year (Previous), typically tend to rebound in January (Nicholas Molar, 2007). However, if we tend to take into account the case of the Indian exchange, the argument in favor of January impact are discarded and also the overall findings states that Gregorian calendar month & Gregorian calendar month months are often a lot of necessary to the investors rather than January once it involves the Indian stock exchanges (Kiran Mehta, Ramesh Chander, 2009)

Day of the week impact is another anomaly that's known, that states that stocks tend to try to to higher on weekday than that on Mon. The existence of the day of the week impact was found from 1950's to 1970's for traditional & Poor's Index. In addition, in later studies, the day of the week impact was tested for various markets and periods. These studies were sorted in step with markets. Presence of day of the week impact is certainly there within the Indian stock markets but here, in contrast to that of western stock markets, BSE & NSE incorporates a positive come back on Mon whereas weekday returns square measure negative. (Mahendra rule, Damini Kumar, 2006).

Scope for further research:

The study focuses not solely on the exchange anomalies however afterward aims to check the anomalies with reference to the Indian stocks Indices. Thus far there has not been any analysis with reference to this space.

**About Anamolies**

A market anomaly is a price action that contradicts the expected behaviour of the stock market. Some financial anomalies appear only once and disappear, but others appear consistently throughout historical chart analysis. Traders and investors can use these unusual market behaviours to find opportunities throughout the stock market. We take a look at some of the most common anomalies, how behavioural finance theory explains their reoccurrence and the ways traders can take advantage of the unusual market.

1. Calendar Effects
2. Holiday Effects
3. Budget Effects

We have collected 10 years data of these three stock indices and perform the tests on them to know that whether the stock indices are being affected by the following effects.

Also, I have found out the effects of Anamolies in these Stock Indices by taking the average returns of last 10 Years on the following Events:

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1. New Year
2. Republic Day
3. Independence Day
4. On the Day of Budget

## RESULTS ON NIFTY 500

### Holiday and Festival Effects

### NEW YEAR ANNUAL RETURNS

| Date | Month | Daily | Annually |
|---|---|---|---|
| 26 | 12 | 0.05% | 13.22% |
| **27** | **12** | **0.43%** | **108.02%** |
| **28** | **12** | **0.61%** | **151.89%** |
| **29** | **12** | **0.42%** | **105.92%** |
| 30 | 12 | 0.14% | 35.25% |
| 31 | 12 | 0.30% | 73.79% |
| 1 | 1 | 0.30% | 74.81% |
| 2 | 1 | 0.05% | 13.24% |
| 3 | 1 | 0.14% | 35.80% |
| 4 | 1 | 0.12% | 31.08% |
| **5** | **1** | **0.49%** | **122.24%** |

### REPUBLIC DAY ANNUAL RETURNS

| | | | |
|---|---|---|---|
| 20 | 1 | -0.25% | -63.31% |
| 21 | 1 | -0.20% | -50.48% |
| 22 | 1 | 0.08% | 19.68% |
| 23 | 1 | 0.29% | 72.76% |
| **24** | **1** | **-0.59%** | **-148.31%** |
| 25 | 1 | 0.19% | 47.86% |
| 26 | 1 | #DIV/0! | #DIV/0! |
| **27** | **1** | **-0.63%** | **-158.64%** |
| 28 | 1 | -0.31% | -76.42% |
| 29 | 1 | 0.11% | 26.46% |
| **30** | **1** | **-0.54%** | **-135.59%** |
| 31 | 1 | 0.19% | 47.27% |

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## INDEPENDENCE DAY ANNUAL RETURNS

| | | | |
|---|---|---|---|
| 11 | 8 | -0.10% | -24.35% |
| 12 | 8 | 0.32% | 79.13% |
| 13 | 8 | 0.03% | 6.41% |
| **14** | **8** | **0.74%** | **184.07%** |
| 15 | 8 | #DIV/0! | #DIV/0! |
| **16** | **8** | **-0.48%** | **-120.37%** |
| 17 | 8 | 0.25% | 61.70% |
| **18** | **8** | **0.42%** | **105.19%** |
| 19 | 8 | -0.06% | -15.64% |
| **20** | **8** | **-0.47%** | **-116.79%** |
| 26 | 9 | 0.16% | 40.70% |

## BUDGET EFFECTS ANNUAL RETURNS

| Budget Effects Average 10 Years | | | |
|---|---|---|---|
| **Date** | **Month** | **Daily** | **Annually** |
| 21 | 1 | -0.20% | -50.48% |
| 22 | 1 | 0.08% | 19.68% |
| 23 | 1 | 0.29% | 72.76% |
| **24** | **1** | **-0.59%** | **-148.31%** |
| 25 | 1 | 0.19% | 47.86% |
| 26 | 1 | #DIV/0! | #DIV/0! |
| **27** | **1** | **-0.63%** | **-158.64%** |
| 28 | 1 | -0.31% | -76.42% |
| 29 | 1 | 0.11% | 26.46% |
| **30** | **1** | **-0.54%** | **-135.59%** |
| 31 | 1 | 0.19% | 47.27% |
| **1** | **2** | **1.04%** | **260.20%** |
| 2 | 2 | -0.05% | -11.79% |
| 2 | 2 | -0.05% | -11.79% |
| **3** | **2** | **-0.72%** | **-181.20%** |

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## ARCH EFFECT ON NIFTY 500

**H0: There is no significant effect of ARCH, GARCH and E-GARCH**

**H1: There is ARCH effect of ARCH, GARCH and E-GARCH**

Null Hypothesis: LOG_RETURNS has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=26)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -17.31063 | 0.0000 |
| Test critical values: | 1% level | -3.432814 | |
| | 5% level | -2.862514 | |
| | 10% level | -2.567334 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG_RETURNS)
Method: Least Squares
Date: 05/08/22 Time: 15:12
Sample (adjusted): 5/07/2012 4/22/2022
Included observations: 2460 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LOG_RETURNS(-1) | -0.872989 | 0.050431 | -17.31063 | 0.0000 |
| D(LOG_RETURNS(-1)) | -0.084502 | 0.046659 | -1.811043 | 0.0703 |
| D(LOG_RETURNS(-2)) | -0.083466 | 0.043265 | -1.929193 | 0.0538 |
| D(LOG_RETURNS(-3)) | -0.066220 | 0.038819 | -1.705858 | 0.0882 |
| D(LOG_RETURNS(-4)) | -0.078688 | 0.033901 | -2.321141 | 0.0204 |
| D(LOG_RETURNS(-5)) | 0.001608 | 0.027913 | 0.057616 | 0.9541 |
| D(LOG_RETURNS(-6)) | -0.083336 | 0.020135 | -4.138857 | 0.0000 |
| C | 0.000462 | 0.000213 | 2.167706 | 0.0303 |

| | | | |
|---|---|---|---|
| R-squared | 0.496196 | Mean dependent var | 3.41E-06 |
| Adjusted R-squared | 0.494757 | S.D. dependent var | 0.014769 |
| S.E. of regression | 0.010498 | Akaike info criterion | -6.272076 |
| Sum squared resid | 0.270214 | Schwarz criterion | -6.253189 |
| Log likelihood | 7722.654 | Hannan-Quinn criter. | -6.265213 |
| F-statistic | 344.9953 | Durbin-Watson stat | 1.995655 |
| Prob(F-statistic) | 0.000000 | | |

Since the P-Value is less than 0.05, Therefore there is no root in the data. Hence the data is Stationary.

Heteroskedasticity Test: ARCH

| | | | |
|---|---|---|---|
| F-statistic | 54.32444 | Prob. F(1,2464) | 0.0000 |
| Obs*R-squared | 53.19572 | Prob. Chi-Square(1) | 0.0000 |

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/08/22 Time: 15:17
Sample (adjusted): 4/26/2012 4/22/2022
Included observations: 2466 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 9.57E-05 | 1.02E-05 | 9.428166 | 0.0000 |
| RESID^2(-1) | 0.146872 | 0.019927 | 7.370512 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.021572 | Mean dependent var | 0.000112 |
| Adjusted R-squared | 0.021175 | S.D. dependent var | 0.000497 |
| S.E. of regression | 0.000492 | Akaike info criterion | -12.39646 |
| Sum squared resid | 0.000596 | Schwarz criterion | -12.39175 |
| Log likelihood | 15286.84 | Hannan-Quinn criter. | -12.39475 |
| F-statistic | 54.32444 | Durbin-Watson stat | 2.079475 |
| Prob(F-statistic) | 0.000000 | | |

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Heteroskedasticity Test: ARCH

| | | | |
|---|---|---|---|
| F-statistic | 54.32444 | Prob. F(1,2464) | 0.0000 |
| Obs*R-squared | 53.19572 | Prob. Chi-Square(1) | 0.0000 |

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/08/22 Time: 15:17
Sample (adjusted): 4/26/2012 4/22/2022
Included observations: 2466 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 9.57E-05 | 1.02E-05 | 9.428166 | 0.0000 |
| RESID^2(-1) | 0.146872 | 0.019927 | 7.370512 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.021572 | Mean dependent var | 0.000112 |
| Adjusted R-squared | 0.021175 | S.D. dependent var | 0.000497 |
| S.E. of regression | 0.000492 | Akaike info criterion | -12.39646 |
| Sum squared resid | 0.000596 | Schwarz criterion | -12.39175 |
| Log likelihood | 15286.84 | Hannan-Quinn criter. | -12.39475 |
| F-statistic | 54.32444 | Durbin-Watson stat | 2.079475 |
| Prob(F-statistic) | 0.000000 | | |

## GARCH EFFECT ON BSE-SENSEX

Dependent Variable: LOG_RETURNS
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Date: 05/08/22 Time: 16:07
Sample (adjusted): 4/25/2012 4/22/2022
Included observations: 2475 after adjustments
Convergence achieved after 24 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
GARCH = C(2) + C(3)*RESID(-1)^2 + C(4)*GARCH(-1)

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.000759 | 0.000167 | 4.554481 | 0.0000 |
| Variance Equation | | | | |
| C | 2.40E-06 | 5.10E-07 | 4.707136 | 0.0000 |
| RESID(-1)^2 | 0.088513 | 0.007873 | 11.24275 | 0.0000 |
| GARCH(-1) | 0.889571 | 0.011153 | 79.75883 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | -0.000642 | Mean dependent var | 0.000485 |
| Adjusted R-squared | -0.000642 | S.D. dependent var | 0.010805 |
| S.E. of regression | 0.010808 | Akaike info criterion | -6.543625 |
| Sum squared resid | 0.289004 | Schwarz criterion | -6.534229 |
| Log likelihood | 8101.736 | Hannan-Quinn criter. | -6.540212 |
| Durbin-Watson stat | 1.999065 | | |

1. P-value of RESID(-1)^2 i.e. ARCH should be less than 0.05.
2. P- value of GARCH(-1) should be less than 0.05.
3. The coefficient if ARCH and GARCH should be positive.
4. Coefficient of sum of ARCH and GARCH should be greater than than 0 but less than 1.

Since all the conditions are fulfilled, Hence, we can say that there is a presence Of GARCH Effect.

## E-GARCH EFFECT ON NIFTY 500

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Dependent Variable: LOG_RETURNS
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Date: 05/08/22 Time: 16:10
Sample (adjusted): 4/25/2012 4/22/2022
Included observations: 2475 after adjustments
Convergence achieved after 43 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(2) + C(3)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(4)*RESID(-1)/@SQRT(GARCH(-1)) + C(5)*LOG(GARCH(-1))

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.000428 | 0.000163 | 2.629082 | 0.0086 |
| Variance Equation | | | | |
| C(2) | -0.349281 | 0.037562 | -9.298680 | 0.0000 |
| C(3) | 0.127038 | 0.014871 | 8.542745 | 0.0000 |
| C(4) | -0.114650 | 0.007170 | -15.99059 | 0.0000 |
| C(5) | 0.973130 | 0.003468 | 280.5824 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | -0.000028 | Mean dependent var | 0.000485 |
| Adjusted R-squared | -0.000028 | S.D. dependent var | 0.010805 |
| S.E. of regression | 0.010805 | Akaike info criterion | -6.585667 |
| Sum squared resid | 0.288827 | Schwarz criterion | -6.573921 |
| Log likelihood | 8154.763 | Hannan-Quinn criter. | -6.581401 |
| Durbin-Watson stat | 2.000292 | | |

In E-GARCH the most important term is C(4) which is also known as Leverage Term.

1. The Coefficient of C(4) must be negative.
2. The P-value should be smaller than 0.05.

Since all the conditions are fulfilled, Hence, we can say that there is a presence of E-GARCH Effect which means that the negative news influences more than the positive news.

Hence we will reject the NULL HYPOTHESIS and accept the ALTERNATIVE HYPOTHESIS.

## IMPLICATIONS AND CONCLUSIONS

The study mainly tests the existence of the market anomalies in the Indian market by comparing averages of the mean of the index values of BSE- SENSEX, NIFTY 500 and NIFTY-50from the year APRIL 24, 2012 to APRIL 23, 2022. The holiday effect was proved in Indian stock market. Also, there is a presence of some other effects like Budget effect which means increase in the volume and price of shares in Budget sessions. Also Republic Day effects, Independence Day effects and New Year effects and political changes effect exists in Indian market. However Indian market needs to be evaluated in depth to prove such effects as proven in foreign markets. Such studies will add value to the potential investors in making right investment decisions and ensure accelerated growth in the security market.

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