Impact of Covid -19 on Performance of Indian Sectoral Indices

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ABSTRACT

Since January 01, 2020, cases of people infected with COVID-19 have emerged in almost all countries and had become the biggest challenge for a highly populated country like India. This pandemic is a significant event causing political and economic turbulence throughout the world. The objective of the current study is to capture the impact of this pandemic on the sectoral indices listed with Nifty. Market efficiency is being tested using the event study methodology with Nifty 50 as a proxy for market movement. To capture the effective impact of the information on the stock indices, to broaden the horizon of study three major events related to public information have been used for the outbreak of COVID-19 in India when the first case was confirmed on January 30, 2020. The most widely used event study methodology is efficient to capture the impact of public information and test market efficiency. To measure the estimated returns most popularly used Market Model has been applied. The statistical tool used to measure the significance in the means of the abnormal returns is the paired t-test and also confirmation through Wilcoxen test, using the SPSS software. Ten indices based on sectoral classification were studied and the results of the paired t-test and Wilcoxen test indicate that the statistically significant impact on the with an estimation period of 240 days and event window of 61 days as the most effected industries were Automobile sector, Banking sector both Private and Public Media and Metal Indices..

Keywords: *Covid-19, Event Study, Market Model, Sectoral Indices, Market Efficiency*.
JEL Codes*: G14, C22, C52, C58.*

1.0 Introduction

Statistics show that financial markets' well-being is one of the most significant factors in every economy's growth. The impact of Covid-19 on the industry based indices are at the heart of the study, trying to understand the present and future implications on the economy. It has become increasingly challenging to disregard companies' response and the related development of indexes in light of a deadly virus's recent occurrence. The disease's outbreak and the large death toll leading state and national wide lockdowns were the incontrollable developments that affected all sectors' indexes. There is an immediate need and attention towards understanding the effects on different manufacturing sectors of the Covid-19 pandemic. The present analyses suggest and describe the impact of media and reports on COVID-19 and its negative and positive effects on different indices.

The Economist (2020) report claims that the crisis is already transforming into an economic and labour shock, impacting the demand and production and distributing the factors of production and other economic and socio-political interlinkages. Also, on other issues, like consumption and investment. At the end of last year, the International Monetary Fund (IMF) said that the world is faced with an unprecedented amount of confusion over the depth and length of this crisis, and it was the worst among the worst economic fallout that happened this century. The IMF estimates the external financing needs for the emerging markets and developing economies are priceless in trillions of dollars. India too is cringing under the pandemic's curse, and as per news reports, the economists say the cost of the COVID-19 lockdown is expected to cost 4.2 per cent of the gross domestic product (GDP).

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The pandemic impacted all the industries, including the manufacturing industry, specifically the services sector such as aviation, retail, tourism, transportation, health care, IT services and the list. Economic stress escalated initially and worsened in the last quarter of 2020 will intensify more in 2021. Forcing employees to maintain social distancing and face mask leads to decreased production on the one side. On the other hand, it also affected the demand for products and services from the consumers. As a result, economic collapse has been seen, and the downfall continues. However, it is a fact that social distancing forms a basis of cost-effective preventive methods to reduce the transmission of the virus. Flattering the caseload curve is crucial in preserving the economic health, but it comes with an economical expense.

2.0 Pandemics and their effect on the economy

Several studies performed earlier to determine the economic effects of epidemics were based on simulation models. According to Karlsson (2014), the effect of the 1918 Spanish flu outbreak on the Swedish economy is based on a neoclassical growth model. It expanded the traditional difference-in-difference estimation method to manipulate the different flu deaths rates throughout Swedish regions. According to Bloom et al. (2005) illustrations, the Asian Development Bank policy briefed to determine the Avian Disease outbreak's economic effect on Emerging markets by macro-economic projections. It was based on the Oxford Economic Forecasting Global Model (OEFGM), which integrates both demands and supply sides and transitions to a new balance aftershock.

Similarly, experiments have measured Extreme Acute Respiratory Syndrome (SARS) economic consequences based on a global model called G-Cubed (Lee &McKibbin 2004). Economic consequences of epidemics are calculated by financial damage resulting from disease-related care costs or profits forfeited due to illness death rates. An outbreak's economic effects in one country are passed to other countries in an international economy due to interconnected distribution networks and financial markets. The pandemics and the years are highlighted in Table 1, and all have shown little to severe impact on global economies and one or other way.

Table 1: Past Pandemics in the late 2000s

Pandemic	Year	Year	Cause	Death Toll
Swine Flu	2009	2010	HINI virus/Pigs	200,000
SARS	2002	2010	Coronavirus/Bats, Civets	770
Ebola	2014	2016	Ebolavirus/Wild Animals	11,000
MERS	2015	-	Coronavirus/Bats,Camels	850
COVID-19	2019	-	Coronavirus/Unknown (possibly pangolins)	99,690 (increasing)

Source – WHO reports and Wikipedia

COVID-19 is triggered through novel coronavirus, and experimental research is still ongoing to study the effect of this disease on humans and other living beings to find a potential cure for both the infectious bodies. Several factors in the epidemiological equations for this infection are dependent on hypotheses such as the source of infection, the level of infection, and the number of asymptomatic cases to symptomatic cases. In the future, scientific studies will uncover the secrets of the epidemic and transmission of the virus. Economic predictions or models are directly related to the epidemiological estimation of the incidence rates. The current study have not planned to use simulation models because of the complexities involved with the disease. The study's primary focus is to identify the most affected sectors among the eleven indices of NSE and enable businesses to take corrective measures. Suggest the government to make relevant policies from the conclusions from the analysis for future action. In the current scenario where the pandemic's strong impact takes the

capital markets, corrective measures are needed to rescue most injured sectors. A policy enacted in time may repair the damages and allow these sectors to emerge from the losses. (Malkiel, 1989; Malkiel & Fama, 1970) Efficient market hypotheses have been questioned on account of the challenges from behavioural sciences and irrational investor behaviour. However, the pandemic's impact on the stock indices and the stock prices' relevant movement needs a more in-depth examination to refer to significant policy measures in time. Consequently, the present study identified the negatively and positively influenced sectors with the most famous technique, i.e., event study methodology with statistical accuracy.

2.1 The effect of COVID -19 in India

The pandemic outbreak of COVID-19 has emerged in Wuhan city in China and then spread worldwide, creating a social and economic shock after February 2020. Recent reports from the World Health Organisation reports show that100 million confirmed cases of COVID-19 positive and 2.16 million deaths with 55.4 recovery rate as on January 27 2021. The report for the South-East Asia Region (SEAR) is 12.76 million confirmed cases and 0.2 million deaths. In India, 10.7 million active cases, with 0.015 million deaths.

Past few years, the world population had faced the emergence of five pandemics and lost many lives, which had a massive impact for a minimum of one year. In this case, the biggest challenge is the non-existence of any vaccine or a cure for the disease. However, new vaccine drives and phase three testing has been under process, and more than 4 lakh service staff received the vaccine. This disease's spread is through human to human transmission through respiratory droplets when they are in close range of less than one meter. Indian Council for Medical Research (ICMR) the disease majorly spreads and has been classified into four stages as follows:

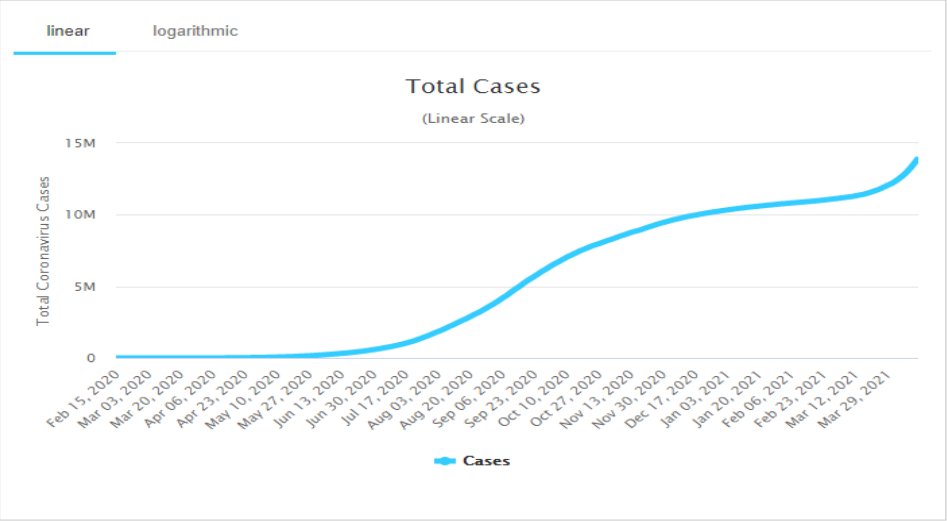
Stage 1: Low number of cases infected. Inflexion through people with travel history, sources traced, and no local spread.

Stage 2: Those who have travel historyinfected their close friends, relatives and others need for isolation and contacts.

Stage 3: Community transmission, where the source of the virus is untraceable. Large random members of the community start developing the disease.

Stage 4: Rapid spread of disease and growing numbersmake the whole geographic region struggle with the virus spread.

Figure 1: Coronavirus cases in India 2021



Source: https://www.worldometers.info/coronavirus/country/india/

The spread of this disease in four stages, while Indian is currently in Stage – II.

Social distancing is the most effective preventive measure for COVID-19, the Indian government announced the Nationwide lockdown on March 24, 2020, for 21 days, and the second phase of the nationwide lockdown was announced onApril 14, until May 03 2020. The third phase of lockdown from May 04 to May 17 and phase 4 from May 18 to May 31 2020. These Indian lockdownsbeing the biggest lockdown extensions in the world with more than 5 million active cases. After that government announced unlock sector-wise, state-wise and finally region wise. Compared with the virus effect, lockdown effect is more on the industries and their economy instability increasing in the country.

Recent studies suggest that the top five global risks' likelihood contains Human-made environmental disasters at fifth place among the evolving risks landscape. Its impact will be felt both in the short and long run (Global Risk Report, 2020; World Economic Forum, 2020) COVID-19 has been a historical case of neglected and unpredictable risk, vaccines, and targeted therapeutics for the treatment of this disease are currently lacking. The world stock markets are now battling the consequences of the outbreak of this pandemic. Through the present circumstances of world quarantine conditions, with all major industrial shutdowns, the impact is expected to fracture the major economies. The World Health Organisation announcement on the COVID-19 being declared a pandemic revealed the beginning of the economic, financial, and social crises.

For the Indian economy, this is a special case of crises with a history of corporate scams in Indian financial markets witnessed during late 2000 seems to have now been aggravated due to the pandemic. With the Prime Minister of India's announcement for the nationwide lockdown on March 24, 2020, for 21 days hampered production, employment, consumption, investments, and supply chain of national and international transactions. The study of industry-wise segregation has representation from various sectors classified separately by NSE India and BSE, which are two major stock exchanges in Indian Capital Markets.

Previous studies on pandemics have not dealt with the impact on all the (Wallis & Nerlich, 2005) industrial indices; the research has focused on unemployment; equity markets and bond markets. Research indicates that pandemics have had an immense impact on economic growth, specifically on the stock markets (Jansson, 2019; Wallis & Nerlich, 2005) during the past. This study concentrates on the immediate effect on Indian Industrial Indices' industrial indices listed with Nifty due to the COVID-19 pandemic.

2.2 Importance of Event analysis

An earlier study on SARS conducted to test the impact of virus spread on the publicly traded hotel stocks using ten days and twenty days showed significantly negative cumulative returns. As the study conclusions were drawn usingthe event study method (Chang, Hsu, & McAleer, 2018; Chen, 2007). The impact of demand and absenteeism of a pandemic would be unevenly distributed across sectors (Steven James & Tim Sargent, 2007). If a pandemic were to occur, human suffering and life loss would outweigh economic concerns (Muhammad &Baig, 2010; Kaur, 2013; Gakhar, Kushwaha and Ashok, 2015). Therefore event study methodology has been most popularly used to investigate a semi-strong form of market efficiency as first recommended by Fama, Fisher, Jensen, and Roll in the year 1969. Osei (1998) market efficiency is not only on account of free and available information on time but also on those who trade and analyze market information. Studies have been conducted on various policy announcements and political events such as elections in emerging economies and have impacted the financial markets.

The analytical and interpretational skill of traders influences the information which flows in the market, followed by investor decisions. Fama, E. (1995) proposed the efficient market hypotheses and suggested the presence of three forms of market efficiency: (1) Strong Form, (2) Semi-Strong

Form, and (3) Weak Form of Market Efficiency. Event study methodology has been used to outline in most of the studies to analyzecorporate stocks and bonds' impact on various events (Ball and Brown, 1968;Cannella, 1993; Kothari, 2007; Malkiel, 1995;MacKinlay, 1997). The strong form of market efficiency is where the prices reflect both publicly available and insider information; it is the most potent market. It also implies that market information cannot be used to predict future prices, technical analysis, fundamental analysis, and insider information are of no use in predicting future prices.

In a nutshell, this methodology quantitatively evaluates the impact of an event (Peterson, 1989) Event study methodology has been the most frequently used tool in financial research, (Armitage, 1995; Sang, 2007) with the market model being used for derivation of abnormal returns using. The current study combines the event study methodology using the market model to assess the impact of Covid-19 on Indian Industry-specific indices.

3.0 Objectives of the study

The purpose of the present study is to examine the impact of the COVID-19 on the Indian Industry-specific Indices listed with Nifty.

3.1 Impact of COVID-19 on Indian indices

Objective of the study: The study's first objective is achieved through an event study analysis on the event-announcement of Spread of Covid -19 through media on 30 January 2020.

H_0 = There is no significant impact of the announcement of Covid-19 on the Indian Sectoral Indices(Index1 to Index 10)

4.0 Research Methodology

Efficient Market Hypotheses says that the capital markets are efficient in reflecting the occurrence of any event. The event studies focus on long-horizons following an event can provide key evidence on market efficiency (Brown & Warner, 1980; Fama, 1991). To get a deeper understanding of industry indices during COVID-19 lockdowns and its impact on India's index (Chang et al., 2018; Shaw, Chilcott, Hansen, & Winzenberg, 2006) Returns during and post-event help in quantifying the impact of different events.

First, the outbreak of COVID-19 confirmed the case in India and second on the first COVID -19 death caused in India and the third being the announcement of the first Lockdown period of 21 days on March 24 2020. (Aljazeera,2020); The pandemic information had run through all the channels of communication like a terror and assumed to have impacted the stock prices also. Through the present research, an attempt is made to understand the statistically significant impact of the events. With the outbreak of COVID-19 in 2020, most developed nations like the United States of America, have harmed its capital markets. The reaction of Indian Indices listed with Nifty is explored using the Nifty 50 and Nifty 100 as a market proxy through the event study methods. The information about the spread of the event started with the confirmed report on the identification of the first case in Kerala state in India on January 31, 2020, then second the first confirmed death of a senior citizen on February 13 2020, and ultimately the announcement of Nationwide lockdown on March 24, 2020, by the Prime Minister of India considering the severity of the pandemic.

With the present condition of the outbreak of COVID – 19, several industries' performance has been shaken (Delloitte Report, 2020). Under these conditions, the present paper's objective is to assess through event study methodology, the impact of the event, and test for the statistical significance of the impact. (NSE) It includes the top 100 companies based on full capitalization from

Nifty 500. It intends to measure large market capitalization companies. The analysis data includes the daily closing prices of all the indices, for the market proxy Nifty 100 has been used. The NIFTY 50 Index represents about 66.8% of the free-float market capitalization of the NSE stocks as on March 29, 2019. For confirmation of the result, the most popular index of Indian capital markets Nifty 50 has also been used. The study period includes the study of closing prices of all the sectoral specific indices and the market indices from 21st June 2019 to until March 13th, 2020.

Event study analysis for estimation of returns has been used extensively (MacKinlay, 1997; Mitchell & Netter, 1994; Williams & Siegel, 1997). This model is used to calculate the estimated returns of stocks depending upon the market returns. The difference between actual returns and estimated returns is the abnormal returns.

4.1 Description of terms

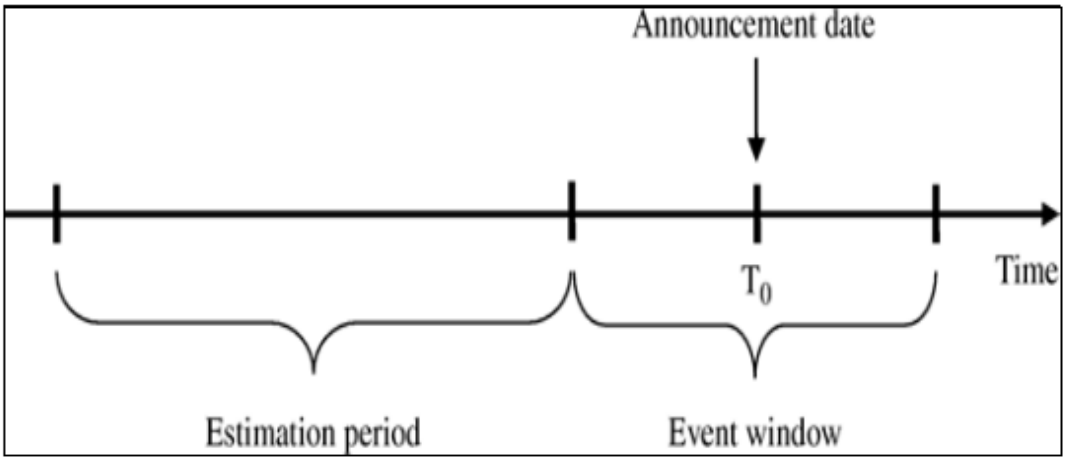
Event: "It is the occurrence of a particular action occurring at a specific time, and is expected to convey some information. Day "0" is the event day for each announcement/security in the present context. Three event days have been considered to evaluate the impact of the COVID-19 pandemic on Indian Stock Indices in the present context. These are as follows:

The estimation window is when daily returns observations for the period before the event window are drawn and used for estimating expected returns. In the present case 250 days" event period, it is commonly used in most event study analysis.

Event Window is the time duration selected before and after the event being considered to study the abnormal return variance.

Estimation Model is a statistical model that relates to the return of any given security to the market portfolio's return. Models with linear specifications follow from the assumed joint normality of asset returns. For any security „i" the market models abnormal returns are calculated using the market model, which is commonly used in event studies to measure abnormal returns (Norman, Strong; 1992). Market Model for estimation of returns has been used extensively (C. MacKinlay, 1997; Mitchell and Netter, 1994; Williams & Siegel, 1997). This model is used to calculate the estimated returns of stocks depending upon the market returns. The difference between actual returns and estimated returns is the abnormal returns. It signifies the deviation from the expected returns and demonstrates the market reaction to a particular event. For the present study market model is used for estimating the expected returns. The estimation period of 1000 days before 60 days of the as the event window is used for each of the events.

Figure 3: Event Study Window



It signifies the deviation from the expected returns and hence is capable of demonstrating the market reaction to a particular event. Daily returns are calculated for each day using data of closing price security.

$Ri = (P1 – P0)/P0$……. (1)

Where,

Ri,t = Return on Stock i, for time t

P1 = Price of Stock I for present day

P0 = Price of Stock I for a previous day

The equation used is: $Ri, t = \alpha i + \beta i * Rm + \varepsilon i,t$…….. (2)

Where, Ri, t is the expected return from stock I at time t, αi, and βi are the estimated values and ε I,t is the error term which is assumed to be „0". Abnormal returns are calculated using the following:

$I_t = R_{i,t} – (\alpha_i + \beta_i * R_m)$ ……..……..(3)

Cumulative Abnormal Returns (CAAR)

CAR (t_1, t_2) where $t_1 < t_2 < t_3 <$…n

Abnormal Returns must be aggregated to draw overall inference for each announcement across two dimensions, through time and across securities. CAR is used to accommodate multiple period event windows.

4.2 Testing for significance of abnormal returns

(Kothari) The null hypothesis is rejected if the test statistic exceeds a critical value, typically corresponding to the 5% or 1% tail region (i.e., the test level or size of the test is 0.05 or 0.01). The test statistic is a random variable because abnormal returns are measured with error using parametric tests such as t-test with the assumption of normality is difficult to test. (Binder) One method to test the statistical significance of the estimated average abnormal return for month s is to assume that the individual ARis's are independent and identically distributed. The assumption of normality of standard deviation of the average abnormal returns may not be fulfilled hence non-parametric tests are also used to measure the significance of abnormal returns. Non-parametric tests reject the hypothesis of positive abnormal, Wilcoxon signed ranks test is used for testing the significance of abnormal returns. It connects both sign and magnitude of abnormal returns. Wilcoxon test assumes that "numbers of absolute values are equal and each is different from zero." Paired sample t-test, Serra (1999), and Wilcoxen test, Corrado (1989); have been used for testing abnormal returns before and after the event.

Analysis for ex-events, abnormal returns has been done using both parametric and non-parametric tests. ARs are tested for three different event AR"s for the pre-event and post-event period. The results of the analysis completed with the help of SPSS 25 for the outbreak of COVID -19 in India conducted on 10 indices from Nifty are presented below. This includes the results from the paired-sample t-test to check for the statistically significant difference in the mean returns before and after the event. Market model has been used with two indices as a proxy for market movement (i.e) Nifty 50.

5.0 Data Sources

Data used is secondary and is related to closing stock prices. The yahoofinance.com is the website where all the relevant secondary data has been downloaded for further analysis. All the data has been analyzed using MS-Excel and SPSS software. Rigorous data cleaning has been done before proceeding with the analysis. These are the inferences from the raw data of monthly returns calculated by taking the natural log of daily returns from the first and last date of the month for each index. There are ten most significant indices included in the sample as mentioned above.

	30 Days-Pre event			30 Days-Post event		
Sector	**Mean**	**Standard Deviation**	**Variance**	**Mean**	**Standard Deviation**	**Variance**
AUTO SECTOR	-0.011	0.013	0.000	-0.094	0.062	0.004
BANK SECTOR	-0.009	0.020	0.000	-0.053	0.045	0.002
FINANCIAL SERVICES SECTOR	0.014	0.012	0.000	0.004	0.034	0.001
FMCG SECTOR	-0.040	0.016	0.000	-0.030	0.016	0.000
MEDIA SECTOR	-0.099	0.026	0.001	-0.160	0.093	0.009
METAL SECTOR	0.045	0.036	0.002	-0.090	0.097	0.010
PHARMA SECTOR	-0.027	0.015	0.000	-0.032	0.032	0.001
PRIVATE BANKS SECTOR	-0.008	0.022	0.000	-0.059	0.044	0.002
PUBLIC BANKS SECTOR	-0.076	0.032	0.001	-0.271	0.123	0.015
REALTY SECTOR	0.081	0.046	0.002	0.059	0.074	0.005

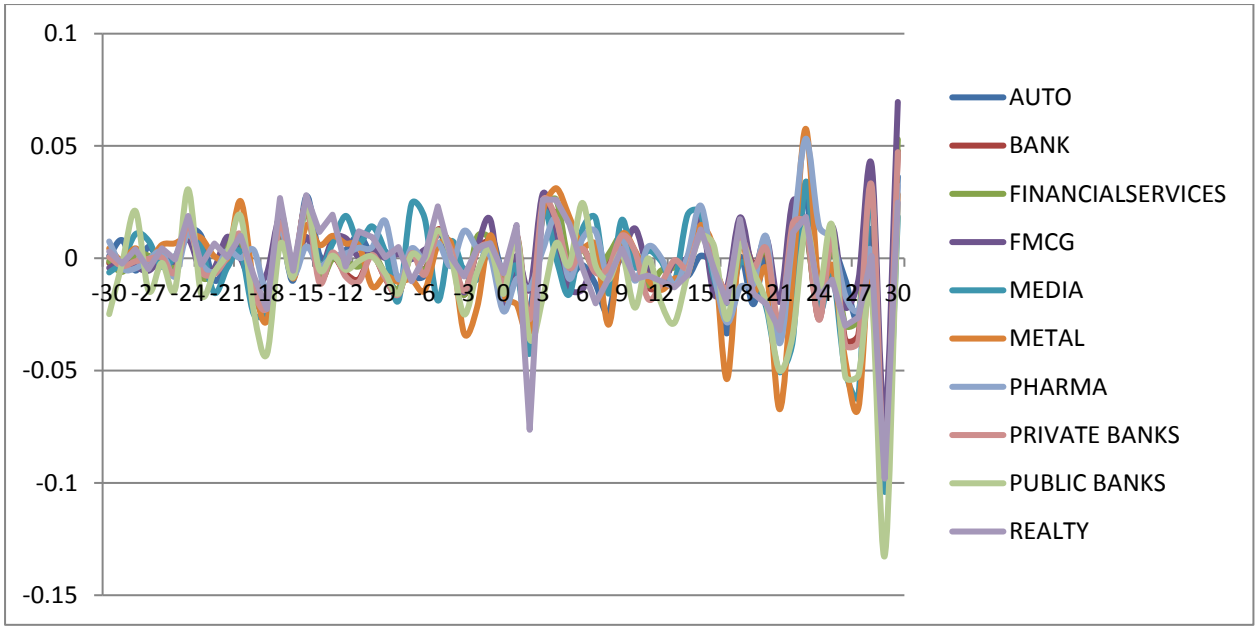
bSource: Calculated from Data using Excel

6.0 Analysis and Discussion

The study is conducted on all the industrial indices of the National Stock Exchange, which are presented in the table above. Each sector represents the group of stocks which represent the whole industry. It's useful to make a comparison for the return risk assessment among peers and with the market. They are broadly categorized as (1) Broad Market Indices (2) Sectoral Indices (3) Thematic Indices (4) Strategy Indices (5) Fixed Income Indices. Daily returns are calculated for each day using data of closing prices from the yahoofinance.com wesite.

The outbreak of COVID-19 started with the epicenter in one province with one confirmed case on 30 January 2020. This taken as the day on which the information ran across all the media had a dramatic impact on all the indices. Measured on the raw data of daily closing prices of these indices the results, indicate a downward market trend for all the indices, including the market benchmarks Nifty 50 from the calculated Cumulative Abnormal Returns (CAR).

Figure No.: Cumulative Abnormal Returns of all Indices



The above charts represent the cumulative abnormal returns (CAR) of the indices for the event window of -30 to +30 (i.e.) 61 days. The calculation is based on the abnormal returns calculated using the market model. The estimated returns have been calculated based on the Nifty 50 as a proxy for market movement. It reflects the downward slope of the CAR of all the indices, most of them moving from positive to negative CAR.

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