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The Impact of COVID-19 and Administrative Interventions on Stock Returns: New Insights From Sectoral Analysis

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We examine the impact of the COVID-19 pandemic and the administrative interventions on stock returns across 21 sectors in India. Almost all sectors reacted negatively to the pandemic announcement on 11 March 2020. The early lockdown resulted in negative abnormal returns. However, this effect was transitory as investors gained confidence and some sectors quickly revived. The unlocking led to positive abnormal returns across all sectors, except chemical products.

I. Introduction

COVID-19 was declared as a pandemic by the World Health Organization (WHO) on 11 March 2020, causing widespread worry, anxiety, and confusion among all people (WHO, 2020). The fear of a health crisis quickly spread to the financial sector (Ramelli & Wagner, 2020). For a survey of literature on COVID-19, see Narayan (2021). There is limited understanding of how stock markets in emerging markets, such as India, which implemented an early lockdown to curb the spread of disease, reacted to the COVID-19 specific events. This study fills this research gap by investigating the impact of the COVID-19 pandemic and the administrative interventions on stock returns across 21 sectors in India.

Using an event study approach and 1807 stocks listed on the National Stock Exchange (NSE), we find that the market was indifferent to the first report of COVID-19 in China, with most sectors showing positive returns. The indifference continued even after the first COVID-19 case in India. However, the WHO's declaration of COVID-19 turning into a full-fledged global pandemic (on 11 March 2020) proved to be a turning point. All sectors started to show signs of a crisis with large negative cumulative average abnormal returns – especially business services, hotels and restaurants, wood and furniture, and trade. The lockdown resulted in negative abnormal returns in the seven-day event-window, which reversed in the 11-day event-window. Selected sectors pertaining to essential services benefitted from the lockdown. The strict country-wide lockdown at just over 500 active cases in a nation (having a population of over 1.3 billion) helped reduce the uncertainty from the market participants. Further, the unlocking resulted in positive abnormal returns in all sectors (with dependencies on mobility).

These findings contribute to the literature in the following ways. First, this article conducts a detailed investigation of COVID-19 by looking at not only outbreak events (He et al., 2020) but also capturing the effects of administrative interventions (locking and unlocking) on 21 sectors' abnormal returns by capturing various phases (i.e., calm, onset, and recovery phases) of the crisis. Second, we use Carhart's (1997) four-factor model to account for momentum and Boehmer, Masumeci, and Poulsen's (1991) [BMP, hereinafter] significance test to produce robust estimates accounting for event-induced variance, whereas previous studies have used cross-sectional *t*-tests, which give biased (overfitted) estimates for common-events. Third, India is unique in the Asian context for two reasons. First, it was among the very few countries, which imposed a nation-wide lockdown even when the number of cases was less than a few hundreds. Second, various sectors in India heavily depend on imports (especially from countries like China), thus creating varying challenges for different sectors, calling for a deeper robust investigation.

The reminder of the paper is organized as follows. Section II discusses data and methodology. Section III provides a discussion on empirical findings of this study and finally we conclude this study in Section IV.

II. Data and Methodology

A. Data

We obtained the trading and financial data of the active firms listed on NSE from the Centre for Monitoring Indian Economy (CMIE) Prowess. We used the first two digits of the NIC-2008 and KLEMS's (2020) classification to categorize firms into twenty-one sectors broadly. Further,

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Table 1. COVID-19 Key Event Dates

Event Date	Description	Confirmed cases- India	Confirmed cases- World
31-Dec-19	Cases of pneumonia unknown aetiology were reported to the WHO China Country Office	0	-
30-Jan-20	First COVID-19 case in India	1	8234
11-Mar-20	COVID-19 is characterized as a pandemic	60	125,879
24-Mar-20	India declared lockdown for three weeks	519	418,295
31-May-20	India starts unlocking	182,143	5,934,936

This table contains the key event dates of disease outbreak and most significant administrative interventions of the government related to the pandemic.

Nifty500 stock returns data was obtained from Thomson Reuters.

B. Methodology

We analyzed the event study based on key event dates as shown in Table 1. We examined cumulative abnormal returns (CAR) for shorter (CAR [-1,1]), medium (CAR [-3,3]) and longer (CAR [-5,5]) windows.

The 252-estimation window is taken to prevent chances of seasonality bias in parameter estimates. The Carhart four-factor model is used to estimate the normal returns (Carhart, 1997).

$$(\mathrm{R}_{i,t} - r_{f,t}) = \alpha_i + \beta_{i,m} \cdot (R_{m,t} - r_{f,t}) + \beta_{i,SMB}$$
$$\cdot SMB_t + \beta_{i,HML} \cdot HML_t \quad (1)$$
$$+ \beta_{i,HML}.UMD_t + \epsilon_{i,t}$$

where, $R_{i,t}$ is the stock return of firm i on the day t, $R_{m,t}$ is the market return on the day, $r_{f,t}$ is the risk free rate on the day t, SMB_t is small minus big, HML_t is high minus low, and UMD_t is up minus low.

Thus, abnormal returns are computed using Equation (2). $R_{i,t}$ is the actual stock return, $(\alpha_i + \beta_i * R_{m,t})$ is used to calculate the realized return, and $R_{m,t}$ is the market return.

$$AR_{i,t} = R_{it} - \left(\widehat{\alpha}_i + \widehat{\beta}_i. R_{m,t} \right) \quad (2)$$

Cumulative abnormal returns across a given period is calculated as:

$$CAR_{i,t} = \sum_{t=T_1+1}^{T_2} AR_{i,t} \quad (3)$$

The cumulative average abnormal returns are:

$$CAAR = \frac{1}{n} \sum_{i=1}^{n} CAR(t_1, t_2) \quad (4)$$

We use the BMP test, which accounts for the variance induced by the event. The t-statistic is given by,

$$t_{BMP} = \frac{\overline{CSAR(T_1, T_2)}}{Std(\overline{CSAR})} \quad (5)$$

where $\overline{CSAR(T_1, T_2)}$ is the cross-sectional average of the abnormal returns cumulative over time, and $Std\left(\overline{CSAR}\right)$ is the standard deviation of $\overline{CSAR(T_1, T_2)}$.

III. Empirical Results

As shown in Table 2, on 31 December 2019, most sectors showed positive significant returns, especially in (CAAR [-5,5]). The positive outlook of the festive season might be one factor. On 30 January 2020, when the first case was reported, we do not see any sector-specific reaction to that news except for industries which are heavily dependent on Chinese imports such as transport equipment which showed significant negative abnormal returns. This shows that the market was functioning as usual, and these periods can be considered as calm periods.

As shown in Table 3, on 11 March 2020, the onset of COVID-19 as a pandemic, most sectors saw significant negative returns in all event windows. Business services, hotels and restaurants, wood and furniture, and trade showed larger negative cumulative average abnormal returns, whereas transport equipment showed significant positive returns. This indicates the beginning of India's crisis due the COVID-19 pandemic.

The lockdown on 24 March 2020 resulted in significant negative returns for all the sectors considered in the event windows. However, some sectors such as food, beverages and tobacco and electricity, gas and water supply showed positive returns in an eleven-day window. This indicates revival of investor confidence in the lockdown.

As shown in Table 4, the unlock 1.0 on 31 May 2020 resulted in positive significant abnormal returns for almost all sectors in an eleven-day event window. The results indicate that the termination of the lockdown revived economic activities leading to positive reactions in almost all sectors with higher gains for sectors which are either labor-intensive or required mobility for robust demand generation.

IV. Conclusion

Using a more rigorous statistical framework, we investigated the short-term implications of the COVID-19 disease outbreak and administrative measures on several sectors in India. Sectors that rely primarily on Chinese imports were harmed during the periods of calm. As the pandemic was announced and spread, the sectors reacted negatively. The government's early lockdown caused widespread disruption in all sectors. On the other hand, some industries responded positively, reflecting investor confidence in the lockdown. All sectors recovered significantly after the lockdown, except for chemical and chemical products. Our research highlights the sectoral variation in abnormal returns and their recovery during various stages of the pandemic.

Table 2. Event Study Results on 31 December 2019 & 30 January 2019

Sector	31 December 2019						30 January 2020					
	CAAR [1,+1]	Pos,Neg	CAAR [-3,+3]	Pos,Neg	CAAR [-5,+5]	Pos,Neg	CAAR [1,+1]	Pos,Neg	CAAR [-3,+3]	Pos,Neg	CAAR [-5,+5]	Pos,Neg
Basic Metals and Fabricated Metal Products	1.52***	68,51	4.07***	73,46	5.19***	83,36	-0.08	61,58	-0.08	62,57	0.57	63,56
Business Services	0.86***	92,59	1.75***	89,62	2.76***	100,51	0.86*	93,58	2.45***	93,58	2.51***	101,50
Chemicals and Chemical Products	0.49*	111,101	1.59*	140,72	2.1***	134,78	-1.10***	90,122	1.69***	130,82	2.19***	130,82
Construction	0.53	61,56	1.94***	64,53	3.11***	71,46	0.96***	72,45	2.86***	77,40	3.11***	75,42
Electrical and Optical Equipment	0.31	48,41	2.06***	55,34	4.43***	61,28	0.83	48,41	3.05***	56,33	2.91***	57,32
Electricity Gas and Water Supply	0.85**	14,07	2.41**	15,06	3.85***	16,05	1.33	13,08	4.36	14,07	4.63**	14,07
Financial Intermediation	-0.12	84,118	2.00**	112,90	5	116,86	-0.22	92,112	0.29	109,95	1.01	106,98
Food and Beverages and Tobacco	1.62***	61,32	0.83	52,41	2.58***	56,37	-0.04	49,44	-2.57	44,49	-3.56	42,51
Hotels and Restaurants	-0.65	8,18	-0.53	9,17	1.01	12,14	0.57	14,12	0.22	12,14	2.56	13,13
Machinery	0.4	30,30	2.84***	41,19	3.57***	45,15	-0.02	27,33	1.57	35,25	1.66	34,26
Other Non-Metallic Mineral	0.54	33,26	1.61***	40,19	3.47***	45,14	-1.22***	19,41	1.07	31,29	0.93	31,29
Other Services	0.13	17,14	0.94	18,13	2.03	18,13	0.44	19,12	1.11	19,12	0.8	19,12
Others	0.99*	35,32	1.34	39,28	2.85**	41,26	-0.85*	31,36	0.45	37,30	0.4	33,34
Post and Telecommunications	0.63	11,10	0.35	11,10	3.82**	13,08	-0.69	09,12	0.44	10,11	3.49	11,10
Pulp, Paper and Paper Products and Printing and Publishing	-1.82	13,25	-2.18	17,21	-1.41	17,21	0.68	19,19	0.33	21,17	0.31	18,20
Rubber and Plastics	1.17***	37,23	2.32***	42,18	2.87***	43,17	-0.46	31,30	-0.34	36,25	-0.06	34,27
Textiles, Textile Products and Leather and Footwear	0.87***	67,37	0.73	64,40	1.55**	66,38	-0.05	54,50	1.32	55,49	1.06	59,45
Trade	0.06	81,82	1.58***	94,69	3.15***	98,65	0.25	93,71	0.95**	102,62	0.8**	89,75
Transport and Storage	0.81*	24,25	1.87**	31,18	3.12***	28,21	-0.97	21,28	2.22*	35,14	0.18*	32,17
Transport Equipment	-1.01	26,41	1.97***	43,24	2.05***	43,24	-1.97***	23,44	-1.59	27,40	-2.74**	28,39
Wood and Furniture	1.31	17,11	1.12	17,11	3.75***	19,09	1.02*	18,10	5.13***	22,06	7.00***	24,04

This table contains the CAARs(%) for various event-windows. The significance (*p<0.01, **p<0.05, and ***p<0.001) is based on the BMP test. Pos and Neg represent the number of firms with positive and negative abnormal returns, respectively.

Table 3. Event Study on 11 March 2020 & 24 March 2020

Sector	11 March 2020						24 March 2020					
	CAAR [-1,+1]	Pos,Neg	*CAAR* [-3,+3]	Pos,Neg	*CAAR* [-5,+5]	Pos,Neg	*CAAR* [-1,+1]	Pos,Neg	*CAAR* [-3,+3]	Pos,Neg	*CAAR* [-5,+5]	Pos,Neg
Basic Metals and Fabricated Metal Products	-0.7	62,57	-0.92*	63,56	0.36	67,52	0.76	67,52	-1.71**	54,65	-0.1	59,60
Business Services	-1.54***	61,90	-5.89***	53,98	-6.49***	46,105	-0.11	74,77	-2.42**	69,82	-0.91	72,79
Chemicals and Chemical Products	-1.71***	82,132	-2.24***	91,123	-0.69	106,108	-0.02	111,103	0.98	117,97	5.25	145,69
Construction	-0.09	63,54	-1.32	61,56	-0.59	63,54	-0.12	68,49	-2.41***	54,63	-0.71	57,60
Electrical and Optical Equipment	1.3	55,34	0.39	48,41	1.32	41,48	0.00	43,46	-1.14**	39,50	1.74	49,40
Electricity Gas and Water Supply	0.41	11,10	-8.08	8,13	-10.1	7,14	3.46*	13,08	4.18**	14,07	8.89***	15,06
Financial Intermediation	0.28	110,94	-1.91**	88,116	-2.04**	86,118	-1.67***	1,04,100	-4.25***	82,122	-4.69***	95,109
Food and Beverages and Tobacco	-1.66***	41,53	-2.62***	41,53	-2	46,48	0.24	50,44	2.84*	54,40	9.88***	71,23
Hotels and Restaurants	-0.65	16,10	-1.96	10,16	-5.06**	10,16	1.69	17,09	1	15,11	-0.13	13,13
Machinery	0.06	34,26	-2.64*	22,38	-1.68	30,30	-1.45*	26,34	-3.12***	23,37	-2.22	25,35
Other Non-Metallic Mineral	-0.96	26,34	-0.15	31,29	3.04	41,19	-2.19***	23,37	-2.91***	27,33	1.62	34,26
Other Services	0.32	16,15	-2.52	14,17	-2.66	12,19	3.65***	22,09	2.68	19,12	5.3	19,12
Others	0.42	31,37	-0.88	33,35	-1.88	35,33	1.29	38,30	0.84	35,33	3.23*	41,27
Post and Telecommunications	1.21	12,09	2.74	11,10	-1.03	11,10	1.12	11,10	-1.25	10,11	-1.98	12,09
Pulp, Paper and Paper Products and Printing and Publishing	-0.71	18,20	-2.14**	15,23	-0.26	18,20	-1.93**	16,22	0.41	22,16	2.06	23,15
Rubber and Plastics	-0.74	36,27	-3.57	30,33	-9.84	37,26	-0.18	36,27	-2.78**	23,40	-0.19	33,30
Textiles, Textile Products and Leather and Footwear	1.22	61,44	-0.84	52,53	1.08	58,47	1.51	61,44	0.94	54,51	3.31	63,42
Trade	-1.53**	70,94	-4.16***	55,109	-3.6*	65,99	-0.3**	90,74	-2.38**	79,85	-0.98	85,79
Transport and Storage	-3.2***	18,31	-5.01**	19,30	-6.17**	16,33	-2.54**	21,28	-1.86	24,25	-0.15	28,21
Transport Equipment	0.9	40,27	2.41	38,29	4.62*	35,32	0.12	35,32	-3.29**	34,33	-1.72*	31,36

This table contains the CAARs% for various event-windows. The significance (*p<0.01, **p<0.05, and ***p<0.001) is based on the BMP test. Pos and Neg represent the number of firms with positive and negative abnormal returns, respectively.

Table 4. Event study results on 31 May 2020

	31 May 2020					
Sector	*CAAR [1,+1]*	Pos,Neg	*CAAR [3,+3]*	Pos,Neg	*CAAR [5,+5]*	Pos,Neg
Basic Metals and Fabricated Metal Products	1.85**	72,47	2.97*	66,53	4.99***	74,45
Business Services	0.8*	88,63	2.41***	86,65	5.74***	107,44
Chemicals and Chemical Products	-0.36	102,113	-0.98*	79,136	-0.14	82,133
Construction	0.98***	66,51	3.37***	74,43	5.46***	85,32
Electrical and Optical Equipment	1.79***	60,29	3.41***	61,28	5.47***	59,30
Electricity Gas and Water Supply	2.07**	14,07	2.32	11,10	7.88	17,04
Financial Intermediation	1.52***	115,90	2.92***	110,95	3.7***	119,86
Food and Beverages and Tobacco	0.49	44,50	1.25	48,46	2.7	51,43
Hotels and Restaurants	3.62**	16,10	6.14**	16,10	11.19***	20,06
Machinery	1.80***	35,26	4.07***	34,27	6.03***	42,19
Other NonMetallic Mineral	-1.6**	23,37	-0.99	26,34	3.29**	34,26
Other Services	0.28	14,07	4.37**	20,11	8.41***	24,07
Others	0.83	32,36	1.05	36,32	3.15***	39,29
Post and Telecommunications	0.95	08,13	2.86	10,11	9.59**	13,08
Pulp, Paper and Paper Products and Printing and Publishing	1.48	22,16	1.32	20,18	1.98	24,14
Rubber and Plastics	1.29*	34,29	2.64	34,29	4.4**	38,25
Textiles, Textile Products and Leather and Footwear	2.84***	66,39	6.77***	78,27	9.87***	84,21
Trade	2.31***	106,59	5.01***	103,62	8.53***	110,55
Transport and Storage	1.03	29,20	2.92**	30,19	5.11***	33,16
Transport Equipment	0.13	29,38	0.24	30,37	1.8	39,28
Wood and Furniture	2.84**	21,08	5.82**	19,10	10.22***	21,08

This table contains the CAARs for various event-windows. The significance (*p<0.01, **p<0.05, and ***p<0.001) is based on the BMP test. Pos and Neg represent the number of firms with positive and negative abnormal returns, respectively.

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