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## Article

# The sectoral effect of demonetization on the economy: Evidence from early reaction of the Indian stock markets

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## FINANCIAL ECONOMICS | RESEARCH ARTICLE

# The sectoral effect of demonetization on the economy: Evidence from early reaction of the Indian stock markets

Mohammad Shameem Jawed<sup>1\*</sup>, Amol S. Dhaigude<sup>2</sup> and Archit Vinod Tapar<sup>3</sup>

**Abstract:** We investigate the impact of the Demonetization of 85% currency in circulation in India on the eve of 8 November 2016 on all the listed stocks spanning over 20 broad industry clusters (sectors) and their affiliation type from the Indian economy over the period of November to Mid-January 2016. Using the event study methodology, we assess the effects of Demonetization, relative to what had been anticipated, as measured by abnormal returns (ARs). The results indicate that Group Affiliated firms witnessed the highest negative abnormal returns both on the event days and during the event window period, while PSUs witnessed the least wrath. On the sectoral front, Demonetization shows a mixed effect in the early days which changes to positive for most of the sectors barring a few. Banking Sector was the worst hit in the early days with a CAAR of  $-1.74\%$ , while many sectors like Pharma, Paper and Wholesale Trading witnessed a windfall gain in the long run.

**Subjects:** Financial and Monetary Economics; Financial Markets; Regulatory Intervention; Cashless Transaction

**Keywords:** event study; demonetization; sectorial analysis; black money; India

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## PUBLIC INTEREST STATEMENT

The impact of the historical decision of demonetization of Nov 2016 on Indian economy is investigated in this study. Data has been collected from BSE archives and CMIE Prowess database. Using event study methodology and parametric and non-parametric significance tests we found that on the whole, all the firms witnessed a significant negative CAAR on the vent day and event window period, which reversed for most of the sectors. Banking was the worst hit while Pharma, Paper and Mining & Minerals made the most windfall gains in the long run—post-Demonetisation.

## 1. Introduction

The government of India, in a historic decision, on the night of 8 November 2016 announced the replacement of its 86% currency in circulation by banning the existing currency of INR 500 and 1000 (RBI Report 2018, <https://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/2ECONOMIC88A5CC5468FA4639A767862F5921304A.PDF>). The rationale put forth by the Government sources for such a bold move was to tackle with the black money problem, counterfeit currency, corruption, checking the terror funding and money laundering and forced adoption of the online transaction by the citizens of the country (Singh, 2018). This was seen as one of the most prominent artificial disruptions to the flow of money in an emerging economy, which had a very high proportion of the informal economy. Due to the sudden replacement of old currency with new ones, and the execution challenges of replacing the 86% of the cash with new one both citizens and economy—especially the informal one had to face the wrath. Many citizens lost lives; there were severe hiccups in the day-to-day functioning of many facets of business operations. Moreover, to make the condition worse Government had imposed serious policing on the quantum of cash which one could withdraw on a given day. This not only severely impacted the day-to-day functioning of the Banks—which started to operate only for facilitating the cash conversion and cash delivery channel—leaving aside their usual money-making business of borrowing and lending.

The present study evaluates the impact of demonetization on Indian stock market—a barometer of the health of the economy—and also seeks to evaluate such impact on various Industry clusters, and firms based on their affiliation type in India.

Event study methodology is used for the study on all the listed firms in the largest Stock exchange of India—Bombay Stock Exchange (BSE) (Black & Khanna, 2007). We choose a large sample for the study as the implication of such an umbrella regulation is supposed to be very different for the nature of firms, their industry cluster, and affiliation type. The industry wise analysis is also warranted as many of industrial sectors—such as Pharma, Travel & Logistics (no collection of tolls for almost over a month across the country), petroleum retailing firms, amongst few others—got benefited through the Government permission of extended use of banned old currency notes for their business transaction. Also, due to the nature of the Indian corporate ecosystem which is heavily dominated by Business Groups and PSUs in terms of their breadth and depth in the market respectively (Srinivasan, 2003).

To the best of our knowledge and belief, no study has analysed the implication of Demonetization on all the listed firms in the country. Secondly, we base our study on the Industry clusters as per the definition of the National Industrial Classification code which classifies the Industries based on their fundamental characteristics and nature of the business. Our study is also the first one to analyse the impact of Demonetization on the firm affiliation type—which gives a good understanding of their interlinks with the informal and cash-based economy and dependencies—which is very important to understand in an emerging economy with weak policing and enforcement of legal framework.

In the next section, we discuss in detail the Demonetization and sequence of events, which followed the historic decision and the related little literature. In Section 3 we discuss in length the Research Design and Methodology used in our analysis. In Section 4 we talk about the data—collection, cleaning, and structuring, Results and Discussion. We conclude the paper with our key findings and inferences drawn from the results in the Conclusion Section 5.

## 2. Demonetization: context & related literature

Demonetization is a process of eradicating old currency by introducing a new one. In India, demonetization happened on 8 November 2016 and INR 500, and INR 1000 currency notes lost their legal tender. This decision had a worth of nearly 15.4 trillion (85% of the currency notes in circulation).

Demonetization was a bold move from the Indian government and was intended to curb the issues of black money, corruption, terrorism funding and fake money issues that are predominant in India (Mali, 2016). Promoting the cashless transactions via the digitisation was highly endorsed by the government during the demonetization period. Economic rationale behind demonetization was generally accredited to mainly three factors—one controlling hyperinflation, two eradicating imitation currencies, and lastly broadening the tax base. Despite that people throughout the country had suffered for replacing old notes with the new one. Long queues in all banks and ATMs were a common scene during the demonetization period. Government also set limits on banks & ATMs for the daily transaction of money. The new currency notes of INR 2000 differed considerably from the existing notes in terms of size and shape. This led to the need of recalibration of ATMs. As the demonetization was a sudden move, there was no time for recalibration of ATMs, leading to increase in the agitation of citizens of India who were in dire need of money. The demonetization is expected to bring structural differences in the longer run and leading to a better reinforcement of the current economy. June 2017 statistics given by the RBI have cast doubt on the “curbing black money” objective of the demonetisation. As per RBI’s report, 99% of the open illegal tenders had returned to them, while 1% amounting to INR16,050 crores did not come back. Moreover, then RBI Governor also stated that the short-term pains of demonetization move will outweigh the long-term benefits. Table 1 shows the timeline of events of the demonetization of November 2016.

### 2.1. Related literature

Demonetization is not a new phenomenon, and world economies are witnessing the act of demonetization on a regular interval of time. For instance, Zimbabwean Government has opted for demonetization in 2015, to fight the country’s record-breaking hyperinflation. In another case, adoption of Euro by the European Monetary Union in 2002 witnessed the act of demonetization. Moreover, the Coinage Act of 1873 demonetised silver in favour of adopting the gold standard as the legal tender of the United States and so on. The impact of demonetization on Indian economy was a huge one and worth scholarly attention. Researcher and practitioners across the globe have expressed varied views on this topic (e.g., Betz, Anderson & Puthanpura, 2017; Bhatnagar, 2017; Chelladurai & Sornaganesh, 2016; Jaggi, Jain, & Verma, 2018; Lawrence & George, 2018), however there is no consensus on the results (Bhavnani, 2018; Ganesan & Gajendranayagam, 2017; Singh & Singh, 2016). This paper attempts to study the impact of demonetization on all the listed stocks spanning over 20 broad industry clusters (sectors) and their affiliation type from the Indian economy over the period of November to Mid-January 2016. Figure 1 and Table 2 highlights the literature on demonetization.

### 3. Research design & methodology

Event study methodology is used for analysing the impact of promoters’ equity dilution on the stock returns. We used the Market Model,<sup>1</sup> for predicting the normal returns.

*Market Model:*

$$R_{i,\tau} = \alpha_i + \beta_i \cdot R_{M,\tau} + \varepsilon_{i,\tau}$$

where,  $R_{i,\tau}$  is the stock return of firm  $i$  on the day  $\tau$ .  $R_{M,\tau}$  is the market return on the day  $\tau$ , and

$\varepsilon_{i,\tau}$  is the random error term.<sup>2</sup>

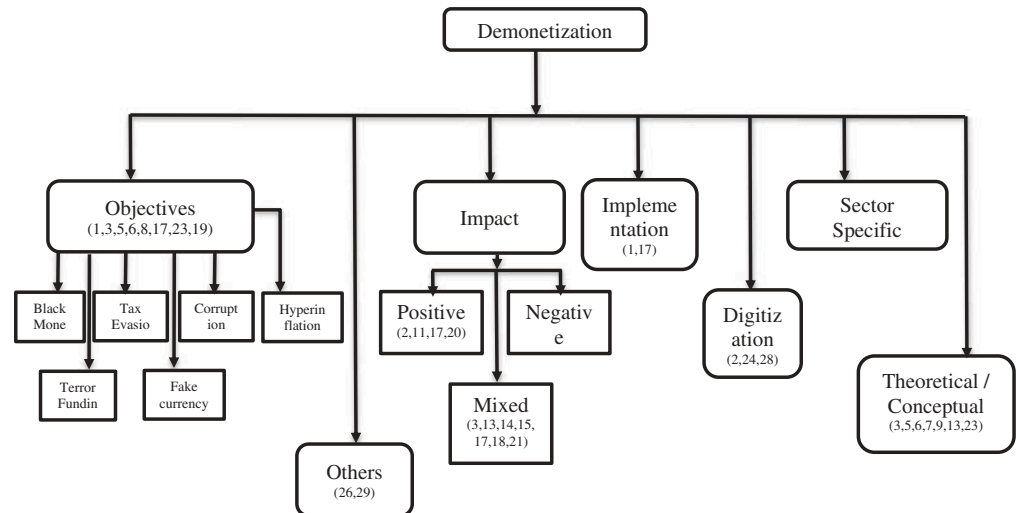
BSE CNX 500<sup>3</sup> Index returns are used as a proxy for market returns. Demonetisation was announced on the night of 8 November 2016, and thus we have considered 9 November 2016 as the event day. Taking cues from previous studies,<sup>4</sup> we chose 220-days estimation window (leaving 20 days before the event as cool off period) and 11-day event window period. We also consider a smaller event window period of 3 days in our analysis. Normal returns were predicted for the event window based on the historical return values of the estimation window observations and an expected return was calculated for each firm which was then subtracted

**Table 1. Timeline of events**

Date	What happened
8 November 2016	The government of India declared 500, and 1000 currency notes lost their legal tender.
10 November 2016	Bank reopens, and millions of people queued to exchange the old currency.
12 November 2016	Sensex registers the biggest single-day fall in 9 months.
13 November 2016	Revised limits of exchange and ATM withdrawals
16 November 2016	Parliament session begins; opposition parties up the ante against the government over the suffering of the poor.
22 November 2016	RBI says banks have received Rs. 5.3 lakh crore in deposits since Nov.08.
16 November 2016	Parliament session begins; opposition parties up the ante against the government over the suffering of the poor.
22 November 2016	RBI says banks have received Rs 5.3 lakh crore in deposits since Nov.08.
24 November 2016	Government extends toll exemption on National Highway till 2nd December mid-night
26 November 2016	Deposits in Jan Dhan accounts soars sharply by around Rs 27,200 crore to Rs 72,834.72 crore in just 14 days
27 November 2016	Rs 32,631 cr deposited in post offices since demonetization
28 November 2016	Banks get about Rs 8.45 lakh crore worth of scrapped notes, RBI says
30 November 2016	RBI limits withdrawal from Jan Dhan accounts to Rs 10,000 a month
6 December 2016	Tax dept seizes Rs 130 crore cash, jewellery, and Rs 2,000 crore of undisclosed wealth has been admitted by taxpayers post demonetization
29 January 2017	Jan Dhan a/cs witness withdrawal of Rs 5000 crore in a month post note ban
31 January 2017	18 lakh taxpayers to get IT notices to explain large deposits post demonetization
1 April 2017	Last day of note exchange: Outside RBI, despair, and wads of old notes
14 April 2017	I-T dept launches the second phase of Operation "Clean Money", to probe 60,000 people
9 May 2017	Currency in circulation may not match pre-8/11 levels
17 May 2017	Clean Money portal launched: "Undisclosed income worth Rs 23,000 crore, 91 lakh new taxpayers since note ban."
21 June 2017	Govt asks banks to deposit junked notes at RBI by July 20
16 July 2017	7% rise in transactions through cards post Demonetization
23 July 2017	Around Rs 71,941 crore undisclosed income detected in the last three years
5 August 2017	Advance tax collections showed a growth of 42 percent the corresponding period in 2016-17.
14 August 2017	2.83 crore I-T returns: 25% increase in filing of tax returns
25 August 2017	New Rs 50, Rs 200 note issued
11 September 2017	former Union finance minister P Chidambaram, Blamed demonetization for the current deceleration in the economy
1 November 2017	A total number of cards as of September 2017 stood at 853 million.
8 November 2017	Demonetization drive completes one year
7 February 2018	The borrower is registered under the GST regime as on January 31
12 February 2018	Mint Street Memo No. 10: Working Capital Constraints and Exports: Evidence from the GST Rollout
2 May 2018	GST revenue collection exceeds Rs 1 lakh crore
8 June 2018	RBI Relaxes Loan Repayment Deadline for MSMEs
21 September 2018	Co-origination of loans by Banks and NBFCs for lending to priority sector
10 December 2018	Urjit Patel resigns from the RBI Governor post citing personal reasons
13 December 2018	Former economic affairs secretary Shaktikanta Das was named the 25th governor of the Reserve Bank of India (RBI) to succeed Urjit Patel

Source: Aggregated from various secondary sources by authors

**Figure 1. Literature on demonetization source: developed by authors.**



from the actual returns on the event window days to get abnormal returns in the events window using the standard event analysis methodology used in financial economics research.

Mostly the event studies in the financial literature rely on the parametric tests. However, the parametric tests have been reported to have one disadvantage that they necessarily require the assumptions of normal distribution of returns which has been time and again refuted by many—e.g., Brown and Warner (1985). If this necessary assumption is violated then parametric tests, yield misspecified test statistics. Researchers have reported the Non-parametric tests are well-specified and more potent at detecting false acceptance of the null hypothesis of non-existence of an abnormal return. The most successful among these tests were the nonparametric sign and rank tests advanced in Corrado (1989), Cowan (1992). Each of these studies documents that sign and rank tests provide better specification and power than parametric tests.

Additionally, since our study has a single event day, we expect the issue of event clustering and presence of stocks' return variance around the event date indicating that simple cross-sectional t-test may reject the null hypothesis too often. We, therefore, followed Boehmer, Masumeci, and Poulsen (1991) and Kolari and Pynnönen (2010) adjustments as suggested in many recent literary works on using financial event analysis (Fernando et al., 2012; Ricci, 2015). The method specified by Boehmer et al. (1991) relies on standardised values of abnormal returns, unlike the basic cross-sectional t-tests. Kolari and Pynnönen (2010) adjustment are done to take care of cross-correlation due to clustering of the event dates along with the presence of higher variance of returns during the event dates over the estimations window. Since there is a higher discrepancy in firm affiliation and characteristics in our samples along with the advantage of having a reasonably large and diverse dataset, we expect a different degree of impact of the regulation on the firms based on their affiliation type, nature of business—sector or industry clusters, and many more.

To sum up the discussion, we use two parametric tests, namely Cross-Sectional t-test and Standardized Cross-Sectional t-Test—famously known as the BMP test. Also, the two Non-Parametric tests, namely—Rank Test (Corrado, 1989) and Sign test (Cowan, 1992). The underlying econometrics has been outlined in the following sub-section.



**Table 2. Key papers on demonetization**

Sr No	Authors	Year	Key Findings
1	Chelladurai & Sornaganesh	2016	Descriptive study. Opined that demonetization created hassles for Indian citizens. Curb black money, fake currency and terror funding were key objectives of demonetization. Implementation was poor and could have been better planned concerning printing sufficient new currency and recalibration of ATMs.
2	Kohli & Kumar	2016	demonetization may result in positive outcomes such as faster technology adoption, the possibility of lower tax rates and an increase in tax base.
3	Nerkar	2016	Described the impact of cash cutoff on Indian citizens. Argues that demonetization is the first step and without full support from public issues like black money and corruption will never go away.
4	Singh & Singh	2016	Highlighted the possible significances of demonetization on various monetary variables and entities.
5	Bhatnagar	2017	Outlined the history of demonetization events in Indian economy with special focus on the 2016 event.
6	Bhausheeb	2017	Impact of demonetization on the disposal of spending, credit and government funds.
7	Betz, Anderson & Puthanpura	2017	elaborated that demonetization can offer a practical sample in which to exam the rationality of various schools of fiscal theory, mainly the Chartalist Institute
8	Desai	2017	conducted an analytical study to assess the impact of corruption on Indian citizens
9	Dhingra	2017	argued that demonetization is a powerful instrument of state policy that works like a divine 'Brahmastra' and has to be used with utmost care and caution.
10	Gupta	2017	Suggested the strategies for managing the cash inflow by various banks
11	Jain	2017	suggested that the move had brought a war on cash and pushing the objective of digitalisation and the cashless economy will reap long term benefits.
12	Singhal	2017	Proved that the banking sector has benefitted from the demonetization move. More specifically the public-sector banks surpassed the private counterparts.
13	Pandey & Jaiswal	2017	Studied the impact of demonetization on Indian economy using the secondary data and argued that black money issue cannot be curbed. Demonetization is one of the bold and early steps in that direction.
14	Ghosh, Chandrasekhar, & Patnaik	2017	Impact of demonetization in terms of rationale, the aftermath, the short and the long term economic impact, and the social and political fallout.
15	Kanakalatha	2017	Suggested the strategies for managing the cash inflow by various banks
16	Rao & Kotian	2017	Studied the impact of demonetization on Indian economy and argued that the short term negative impacts will fade away quickly making a pathway for higher order structural reforms
17	Reddy	2017	An exploratory study on the demonetization event and paved the way for better implementation

(Continued)



Sr No	Authors	Year	Key Findings
18	Samuel & Saxena	2017	studied the short and long-term influences of demonetization on different sections of the Indian economy and provided mixed results.
19	Chand & Singh	2017	provided a vivid perspective on the estimation of black money and historical analysis of unaccounted money in India
20	Singh & Panwar	2017	Conceptual paper and outlines the way ahead for demonetization.
21	Sharma	2017	addressed various consequences, benefits and drawbacks, and issues relating to demonetization in terms of its impact on black money, fake currency issues, industry, business, service class and different segment of the society.
22	Sivankutty	2017	Studied the impact on demonetization on Indian GDP and found a negative relationship.
23	Iyer	2017	provided a vivid perspective on the estimation of black money and historical analysis of unaccounted money in India
24	Bansal & Jain	2018	Analysed the adoption and use of digital banking after the demonetization set off and found that the overall adoption has increased, and use has been consistent.
25	Jaggi, Jain & Verma	2018	Studied the impact of demonetization on the supply chain regarding bullwhip effect and argued that digitisation can help to minimise the losses.
26	Kannan et al.,	2018	conducted a Predictive analysis to view the mindset of people and found that initial feeling of support and optimise is fading, and there is an increase in the negative tide
27	Lawrence & George	2018	Analysed the impact of demonetization on the Indian retail sector and proved that the losses in the short-term will outweigh the long-term benefits
28	Pal et al.,	2018	Studied the adoption of mobile wallets aftermath of demonetization using seven constructs from existing technology adoption literature and three moderators.
29	Roy et al.,	2018	Conducted a sentimental analysis using social media data exchanges and found out the temporal negative impact of the move.

Source: Developed by authors

### 3.1. Parametric tests

#### 3.1.1. Cross-sectional t-test

Brown & Warner (1980) have proved that cross-sectional t-test has higher power over normal time series t-tests. It is robust enough to handle the increase in abnormal returns variance induced by the event itself. However, later it was proved by Boehmer et al. (1991) that standardised cross-sectional test developed by them has greater power of the test statistics, which has been the workhorse for the analysis done in the first essay. However, to assure robustness of the test results, We have also used this method of testing the hypotheses.

Cross-sectional t-test assumes the null hypothesis that the average abnormal returns (averaged over all the firms) is equal to 0 and is calculated as under:

$$t_{\text{Cross-sectional}} = \frac{CAAR(T_1, T_2)}{\hat{\sigma}_{CAAR(T_1, T_2)}}$$

where,  $\hat{\sigma}_{CAAR(T_1, T_2)}$  is the estimated cross-sectional variance of the abnormal returns, calculated as under

$$\hat{\sigma}_{CAAR(T_1, T_2)}^2 = \frac{1}{N(N-1)} \sum_{i=1}^N [CAR_i(T_1, T_2) - CAAR(T_1, T_2)]^2$$

### 3.1.2. Standardised cross-sectional test (BMP 1991)

Boehmer et al. (1991) have shown that plain standardised residual test developed by Patell (1976) works well under conditions of no increase in the variance of abnormal returns during the event window period. However, in cases where there is the occurrence of event-induced variance increase, then the standardised residual test rejects the null hypothesis too often.

Boehmer et al. (1991) in their method modify the standardised residuals test developed by Patell (1976). They, based on the cross-section of the event window period abnormal returns, combine an empirical version of the event variance estimate. This test is assumed to be robust enough to event-induced variance to stock returns and t-stat for the null hypothesis that CAAR = 0 is given by,

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

where,  $\overline{CSAR}(T_1, T_2)$  is the cross-sectional average of the abnormal returns cumulated over time (as calculated in the method specified by Patell's (1976) method of the standardised residual test), given by

$$\overline{CSAR}(T_1, T_2) = \frac{1}{N} \sum_{i=1}^N CSAR_i(T_1, T_2)$$

Where,  $Std(\overline{CSAR})$  is the standard deviation of  $\overline{CSAR}(T_1, T_2)$  calculated as,

$$Std(\overline{CSAR}) = \sqrt{\frac{1}{N(N-1)} \sum_{i=1}^N [CSAR_i(T_1, T_2) - \overline{CSAR}(T_1, T_2)]^2}$$

## 3.2. Non-parametric test

### 3.2.1. Generalised sign test

Proposed by Cowan (1992), the generalised Sign test is based on the ratio of positive abnormal returns ratio over the event window period. The null hypothesis is based on the assumption that the positive returns ratio of the event window does not deviate from the positive abnormal returns ratio during the estimation window. The test statistics is calculated as follows:

$$t_{GST} = \frac{p_{\text{event window}}^+ - p_{\text{estimation window}}^+}{\sqrt{\frac{p_{\text{estimation window}}^+ (1 - p_{\text{estimation window}}^+)}{N}}}$$

where  $p_{\text{event window}}^+$  is the ratio of positive abnormal returns in the event window period. Moreover,  $p_{\text{estimation window}}^+$  is the ratio of abnormal returns in the estimation window period.

### 3.2.2. Corrado's rank test

Rank test, a relatively more robust test in comparison to the standard parametric tests was proposed by Corrado (1989). Following the same approach as the generalised sign test, the rank test is free from the necessity of the symmetry of the cross-sectional abnormal return distribution. To apply this test, we have transformed each firm's abnormal returns into their respective ranks. To do so, let

$$R = 1/N \sum_{(I=1)}^N (KIO - Kbar)/S(K)$$

Where  $S(K)$  is the standard deviation.

This statistic is distributed asymptotically as unit normal. Cowan and Sergeant (1996) document that if the return variance is unlikely to increase, then Corrado's rank test is better specified and more powerful than parametric tests. With the increase in variance, however, this test is misspecified.

#### 4. Data, empirical results, and discussion

##### 4.1. Data

Data needed for the empirical analysis was collected from secondary sources—like stock exchange data archives and PROWESS database provided by the Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE-Prowess). We collected trading data (daily adjusted stock returns) from 15 November 2015 till the end of 15 January 2017 for all the firms listed on the Bombay Stock Exchange (BSE).<sup>5</sup> We also collect firm identity variables viz., ownership type and industry classification (National Industrial Classification name and code). The 13-digit NIC code classifies all the registered companies in India into specific industrial clusters. We group firms to 6-digit NIC codes into various sectors. Based on this classification we get 20 key industrial clusters/sectors.<sup>6</sup> The list of sectors and individual sample firms for analysis is outlined in Table 3.

A total of 4959 firms are listed on the BSE. Of these many firms are highly illiquid and are very thinly traded. We drop all such firms who have less than 110 distinct returns data in the estimation window of 220 days. We also drop all the firms that do not have even a single day of missing returns data in the event window period [+5, -5 days]. We also look for firms, which had any earnings announcements or any major corporate events, which may have an impact on the trading volume and prices, coinciding with the event day and event window period, and drop them from our analysis. After the tedious data preparation and cleaning exercise, we were left with 2478 firms in our final sample for analysis.

We then segregated our data based on firm affiliation type into four major buckets—Standalone (Indian) Private—1295, Group Affiliates—1003, Foreign Subsidiaries/Affiliates—107, and Government Owned firms, also known as Public Sector Undertakings (PSUs)—81.

Table 3: Industry clusters/sectors, their respective 7-digit NIC code and Number of firms in the sample data.

##### 4.2. Empirical results & discussion

###### 4.2.1. Short-run price impact of demonetization

4.2.1.1. *Event study based on firm affiliation type.* We segregate the data based on firm affiliation type. Since in India, business groups are a dominant force and enjoy the benefits of interlink between the listed group affiliates and unlisted subsidiaries of the group holding. The other dominant force in terms of size (market capitalisation) but not numbers is the Government-owned enterprises. They either operate in a monopolistic environment or are too large in their respective sectors compared to their industry peers. Managers appointed by the government and controlled by the government-appointed board members run them. They are mostly plagued by inefficiencies and typical state-run organisational issues. Third dominant group is the Standalone Private (Indian) firms. Though large in number, they are mostly run by professionals or first generation entrepreneurs. Last dominant force is the subsidiaries of the foreign multinationals. These firms are very efficiently managed and darlings of the market. They have good corporate governance practices and also have superior technology over their peers. Thus, all four types of firms are very different in their interlocks, vendor-customer engagements, market competition, and corporate governance practices.

**Table 3. Industry Clusters for the Sectoral analysis - segregated based on 7-digit NIC code**

Sl. No.	Industry Cluster/Sector	7-Digit NIC Code	Number of Firms
1	Agriculture & Food Processing	1010111	143
2	Automobiles & Auto-Ancillary	1010145	115
3	Banking Services	1020100	36
4	Construction—Housing & Commercial Complexes	1010601	21
5	Construction—Industrial	1010602	133
6	Construction Materials	1010130	80
7	Consumer Goods	1010125	69
8	Diversified	1010155	48
9	Hospitality and Tourism	1010401	37
10	<sup>7</sup> & ITES	1010408	103
11	Manufacturing—Equipment & Machinery	1010140	161
12	Metal & Metal Works	1010135	151
13	Mining & Minerals	1010203	15
14	Non-Banking Financial Institutions	1020315, 1020400, 1020501, 1020590, 1020900	270
15	Paper, Printing & Related Items	1010150	59
16	Pharmaceuticals & Chemicals	1010120	362
17	Telecommunication Services	1010406	15
18	Textile	1010115	183
19	Trading—Wholesale & Retail	1010404	252
20	Transportation & Logistics	1010405	32

The results are reported in Tables 4 and 5. Table 4 reports the CAARs and t-statistics of Parametric tests while Table 5 report the statistics of Non-Parametric tests.

On the event day, all type of firms reported negative returns wherein Group Affiliates witnessed the highest negative CAAR of  $-2.96\%$  while PSUs witnessed the least negative abnormal returns of  $-1.32\%$ . However, the shorter event window period the PSUs witnessed a significant positive return while others continued their negative trail. By the 5<sup>th</sup> day—in the 11-day event window period the CAARs mounted to almost  $-14\%$  for the Group Affiliates,  $-12\%$  each for the Private and Foreign firms and close to  $-7\%$  for the PSUs. When we only look at the negative returns from the event day for a weeks' trade, we find that the negative abnormal returns are in tune of 8–10% for all the firm types except for the PSUs, which only witnessed  $-2.79\%$  negative returns. These results are statistically significant for most of the conducted tests at a 1% level of significance.

The results indicate that the traders had a perception that PSUs by being Government undertakings would be shielded by the impact of the currency crunch in the markets. Also, since most of these PSUs deal with vendors and customers, which are government organisations, keeping their liquidity need at a much lower level. The most surprising results came from the Group Affiliates as one would expect that since they are conglomerates and have good interlinks with their subsidiaries both at the upstream and downstream shall not get impacted by the cash crunch so badly—however, traders and investors had a different opinion on the same.

**4.2.1.2. Event study based on industry clusters/sectors.** We then segregate our data based on industry cluster/sectors and analyse the short term impact of the regulation on the stocks. Since

**Table 4. Parametric tests**

Event Window	t-test cross-sectional				BMP Test (Boehmer et al.)			
	PSU	Group Affiliates	Foreign-owned	Private Indian	PSU	Group Affiliates	Foreign-owned	Private Indian
	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)
(0,0)	-1.32 (-4.43)	-2.96 (-26.49)	-1.98 (-7.19)	-2.68 (-22.83)	-1.32 (0.742)	-2.96 (-2.02)	-1.98 (-1.54)	-2.68 (-2.01)
(-1, +1)	1.78 (3.69)	-1.43 (-8.89)	-1.81 (-4.61)	-1.41 (-8.01)	1.78 (0.861)	-1.43 (-0.69)	-1.81 (-0.89)	-1.41 (-0.64)
(-5, +5)	-7.53 (-6.84)	-14.27 (-35.95)	-12.3 (-12.16)	-12.57 (-27.28)	-7.53 (-1.28)	-14.27 (-2.81)	-12.3 (-2.75)	-12.57 (-2.33)
(0, +5)	-2.79 (-3.330)	-10.82 (-36.685)	-8.32 (-11.940)	-10.49 (-33.171)	-2.79 (-0.506)	-10.82 (-2.76)	-8.32 (-2.47)	-10.49 (-2.93)
(0, +40)	4.31 (2.826)	-6.67 (-13.447)	-3.87 (-2.728)	-5.46 (-7.692)	4.31 (0.593)	-6.67 (-1.11)	-3.87 (-0.622)	-5.46 (-0.658)

**Table 5. Non—parametric tests**

Event Window	Corrado Rank Test				Generalised Sign Test			
	PSU	Group Affiliates	Foreign-owned	Private Indian	PSU	Group Affiliate	Foreign-owned	Private Indian
	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)	CAAR (%) (t-stat)
(0,0)	-1.32 (-4.43)	-2.96 (-2.24)	-1.98 (-1.73)	-2.68 (-2.44)	-1.32 (-3.58)	-2.96 (-20.02)	-1.98 (-5.43)	-2.68 (-18.63)
(-1, +1)	1.78 (0.389)	-1.43 (-0.54)	-1.81 (-0.851)	-1.41 (-0.654)	1.78 (3.13)	-1.43 (-9.29)	-1.81 (-4.65)	-1.41 (-9.86)
(-5, +5)	-7.53 (-2.08)	-14.27 (-3.29)	-12.3 (-3.22)	-12.57 (-3.36)	-7.53 (-5.09)	-14.27 (-23.87)	-12.3 (-7.94)	-12.57 (-23.26)
(0, +5)	-2.79 (-1.15)	-10.82 (-3.05)	-8.32 (-2.78)	-10.49 (-3.57)	-2.79 (-3.31)	-10.82 (-24.76)	-8.32 (-8.14)	-10.49 (-25.71)
(0, +40)	4.31 (-0.421)	-6.67 (-0.325)	-3.87 (-0.118)	-5.46 (-0.392)	4.31 (2.68)	-6.67 (-12.86)	-3.87 (-2.53)	-5.46 (-11.42)

the different industry has its characteristics and dealings with their vendor-customer and a different need for liquid cash for taking care of operations. Some are labour intensive while some deal in credits both at both sides of the supply chain. Moreover, certain sectors—especially the core/traditional sector have a good presence of informal economy which operates and commands a sizable market—thus would change the dynamics of the product market at a very different level owing to the cash crunch caused by the regulation. We divide the firms into 20 major industry clusters and perform the same set of calculations and tests. We report the results of the analysis in Tables 6 and 7. The test statistics for Parametric tests are reported in Table 6, while Table 7 reports the test statistics of Non-Parametric tests.

As a whole, on the event day most of the sectors witnessed negative abnormal returns barring a few, namely—Consumer Goods (0.84%), IT/ITES (1.22%), Pharmaceuticals & Chemicals (0.25%), Textiles (0.26%) and Wholesale Trading (0.51%)—which mostly remained positive throughout the event window period and kept on increasing the respective initial gains on a cumulated basis. However, sectors like Banking showed a significant negative CAAR of  $-1.74\%$  on the event day, which later reversed to  $+2.16\%$  in the 11-day event window. These results were statistically significant as per the cross-sectional t-test and Corrado Rank test.

Certain sectors like Mining and Minerals, which showed early negative abnormal returns on the event day increased its negative CAARs to almost  $-2.57\%$  in the 11-day event window. It was mostly owing to the risk owing to the day-to-day operations since they are a highly labour-intensive industry on the informal side. Barring one or two cases like this most of the sectors reversed the early signs of negativity or at least reduced it in the 11-day event window. Most of the above-mentioned results were statistically significant by one of the Parametric or Non-Parametric tests. However, the BMP test mostly returned insignificant test statistics for short-run.

#### 4.2.2. Long run price reversal

Since, demonetization was a vanilla regulation on all the firms, according to the Government shall strengthen the economy in the long run, as more and more capital would return to the formal sector. Thus, one school of thought—going by which the GoI took this initiative—that it would be a temporary shock to the economy which shall revert to normal sooner and shall make it better off in long run. However, another school of thought had a contrarian view on this matter. They believed that such a move coupled with a poor implementation would result in destroying the informal economy—some estimated which to be more than 20% of the GDP—which would have a trickle-down effect on the formal sector as they interact in one way or the other. Since, the stock prices in an efficient market demonstrate the intrinsic value of the firm which is nothing but the cumulated present value of all the future cash flows, expected the sectors or industry clusters to suffer a lot who had a higher dealing with such an informal sector—either at the supply or demand side of the business. Secondly, it was also believed that the sectors that had a higher proportion of daily wage labourers would face operational hiccups leading to production delays and cost overruns. Thus, we also look at the long run price impact of the policy on the stock prices by calculating the CAARs of the next 40 days after the demonetization [0, 40]—for firms based on their affiliation type and their respective industry clusters/sectors. The results are reported in Table 4–7.

On the *firm-affiliation type* analysis, we find that almost all type of firms better their CAARs in the next two months of the trading ~40-day window. Group affiliates maintain their lead in the quantum of negative CAARs over others. However, PSUs were the only one which showed a complete reversal and gives a  $+4.31\%$  CAAR in the long-run. The results are mostly significant using various parametric and non-parametric tests, even after controlling for the event-induced variance and clustering effects.

On the *industry cluster/sector level* analysis of the data, we find that most of the sectors under study reversed the early negative CAARs and reported a positive Abnormal Return in the 40-day event window post demonetization. This showed either merit in the Governmental claims or overreaction of the market in the process of mean reversion. Highest gainers were Mining & Minerals ( $+23\%$ ), Paper & Printing ( $+24\%$ ), Pharma & Chemicals ( $+18\%$ ), NBFC ( $+14\%$ ) and Auto & Ancillary ( $\sim +14\%$ ), while sectors like Banking, Construction, Hospitality & Tourism and Travel & Logistics covered their early



Table 6. Parametric test statistics

Sectors	t-test cross-sectional					BMP Test (Boehmer et al.)				
	(0, 0)	(-1, +1)	(-5, +5)	(0, 5)	(0,40)	(0, 0)	(-1, +1)	(-5, +5)	(0, 5)	(0,40)
1	0.28 (0.94)	1.12 (2.94)	0.29 (0.379)	1.27 (1.95)	7.48 (3.62)	0.28 (0.058)	1.12 (0.545)	0.29 (-0.028)	1.27 (0.387)	7.48 (0.864)
2	-0.22 (-0.62)	1.5 (3.14)	5.48 (5.58)	2.3 (3.69)	13.9 (7.23)	-0.22 (-0.19)	1.5 (0.61)	5.48 (1.10)	2.3 (0.71)	13.9 (1.07)
3	-1.74 (-8.07)	-0.12 (-0.38)	2.06 (2.13)	-2.18 (-4.12)	6.67 (4.09)	-1.74 (-1.46)	-0.12 (-0.11)	2.06 (0.38)	-2.18 (-0.89)	6.67 (0.80)
4	0.01 (0.00)	0.17 (0.21)	4.28 (1.44)	1.09 (0.51)	5.85 (1.42)	0.01 (0.16)	0.17 (0.00)	4.28 (0.82)	1.09 (0.37)	5.85 (0.59)
5	0.05 (0.20)	1.93 (3.54)	4.21 (3.26)	0.12 (0.20)	4.86 (2.67)	0.05 (0.00)	1.93 (0.71)	4.21 (0.68)	0.12 (0.11)	4.86 (0.56)
6	-0.16 (-0.47)	0.73 (1.62)	0.54 (0.53)	1.14 (1.37)	7.08 (3.36)	-0.16 (-0.42)	0.73 (0.30)	0.54 (0.05)	1.14 (0.29)	7.08 (0.50)
7	0.84 (2.14)	1.48 (2.40)	1.24 (1.12)	1.52 (1.84)	6.34 (2.70)	0.84 (0.70)	1.48 (0.85)	1.24 (0.45)	1.52 (0.63)	6.34 (0.90)
8	-0.01 (-0.01)	1.32 (1.59)	1.33 (1.14)	0.27 (0.26)	5.49 (1.48)	-0.01 (-0.08)	1.32 (0.74)	1.33 (0.59)	0.27 (0.16)	5.49 (0.71)
9	-0.01 (-0.01)	1.76 (1.97)	2.06 (1.44)	1.04 (1.10)	7.28 (1.78)	-0.01 (-0.14)	1.76 (0.85)	2.06 (0.64)	1.04 (0.57)	7.28 (0.74)
10	1.22 (3.13)	2.48 (3.47)	-0.18 (-0.15)	1.01 (1.42)	10.74 (4.62)	1.22 (0.97)	2.48 (1.05)	-0.18 (-0.11)	1.01 (0.42)	10.74 (1.16)
11	0.32 (1.30)	1.42 (3.79)	1.33 (2.04)	0.92 (1.84)	13.48 (10.46)	0.32 (0.25)	1.42 (0.66)	1.33 (0.38)	0.92 (0.27)	13.48 (1.81)
12	-0.06 (-0.20)	0.78 (1.50)	1.53 (1.89)	-0.14 (-0.23)	16.12 (6.70)	-0.06 (-0.14)	0.78 (0.28)	1.53 (0.42)	-0.14 (-0.00)	16.12 (1.64)
13	-0.53 (-0.75)	-0.05 (-0.08)	-2.57 (-1.96)	0.1 (0.04)	23.38 (2.97)	-0.53 (-0.66)	-0.05 (-0.40)	-2.57 (-1.39)	0.1 (-0.36)	23.38 (2.21)
14	-0.38 (-0.89)	-1.00 (-1.06)	0.6 (0.19)	0.94 (0.54)	13.98 (1.87)	-0.38 (-1.05)	-1.00 (-0.95)	0.6 (-0.11)	0.94 (-0.25)	13.98 (0.67)
15	-0.14 (-0.35)	-0.17 (-0.25)	-1.11 (-0.76)	-0.25 (-0.26)	23.85 (6.85)	-0.14 (-0.27)	-0.17 (-0.21)	-1.11 (-0.34)	-0.25 (-0.14)	23.85 (2.53)
16	0.25 (1.72)	1.99 (6.87)	3.99 (6.93)	3.5 (8.24)	18.01 (16.14)	0.25 (0.17)	1.99 (0.93)	3.99 (0.98)	3.5 (1.14)	18.01 (2.15)
17	0.57 (1.10)	-0.03 (-0.03)	-1.04 (-0.79)	0.26 (0.21)	14.31 (2.68)	0.57 (0.38)	-0.03 (0.09)	-1.04 (-0.18)	0.26 (0.09)	14.31 (1.30)
18	0.26 (1.00)	0.83 (1.84)	1.14 (1.40)	0.77 (1.42)	13.33 (6.41)	0.26 (0.41)	0.83 (0.57)	1.14 (0.47)	0.77 (0.52)	13.33 (1.74)
19	0.51 (2.12)	1.88 (4.34)	2.99 (2.95)	1.74 (2.39)	16.71 (7.35)	0.51 (0.52)	1.88 (1.19)	2.99 (0.83)	1.74 (0.60)	16.71 (1.20)
20	-0.18 (-0.42)	0.44 (0.53)	0.53 (0.33)	0.55 (-0.42)	3.76 (1.11)	-0.18 (-0.38)	0.44 (0.02)	0.53 (-0.01)	0.55 (-0.38)	3.76 (0.33)

**Table 7. Non—parametric test statistics**

Sectors	Corrado Rank Test					Generalized Sign Test				
	(0, 0)	(-1, +1)	(-5, +5)	(0, 5)	(0,40)	(0, 0)	(-1, +1)	(-5, +5)	(0, 5)	(0,40)
1	0.28 (0.263)	1.12 (0.816)	0.29 (0.301)	1.27 (0.649)	7.48 (1.39)	0.28 (1.21)	1.12 (2.54)	0.29 (0.681)	1.27 (2.03)	7.48 (2.71)
2	-0.22 (-0.70)	1.5 (0.55)	5.48 (1.04)	2.3 (0.38)	13.9 (1.43)	-0.22 (-2.37)	1.5 (2.10)	5.48 (3.23)	2.3 (1.73)	13.9 (7.52)
3	-1.74 (-1.88)	-0.12 (-0.16)	2.06 (0.37)	-2.18 (-0.87)	6.67 (0.35)	-1.74 (-3.42)	-0.12 (-0.40)	2.06 (3.27)	-2.18 (-3.08)	6.67 (3.61)
4	0.01 (0.15)	0.17 (0.48)	4.28 (1.03)	1.09 (0.24)	5.85 (0.80)	0.01 (-0.63)	0.17 (1.11)	4.28 (1.98)	1.09 (-0.19)	5.85 (1.98)
5	0.05 (0.08)	1.93 (1.16)	4.21 (0.89)	0.12 (0.05)	4.86 (0.94)	0.05 (1.10)	1.93 (2.15)	4.21 (2.49)	0.12 (-0.28)	4.86 (1.63)
6	-0.16 (-0.36)	0.73 (0.62)	0.54 (-0.01)	1.14 (0.35)	7.08 (1.07)	-0.16 (-1.41)	0.73 (0.83)	0.54 (-1.63)	1.14 (0.16)	7.08 (3.30)
7	0.84 (0.10)	1.48 (1.37)	1.24 (0.55)	1.52 (0.69)	6.34 (1.22)	0.84 (2.62)	1.48 (2.14)	1.24 (0.93)	1.52 (2.38)	6.34 (3.58)
8	-0.01 (0.07)	1.32 (0.89)	1.33 (0.40)	0.27 (0.05)	5.49 (1.10)	-0.01 (0.47)	1.32 (1.91)	1.33 (0.76)	0.27 (-0.98)	5.49 (2.20)
9	-0.01 (-0.08)	1.76 (1.27)	2.06 (0.55)	1.04 (0.65)	7.28 (1.76)	-0.01 (-0.78)	1.76 (2.19)	2.06 (-0.11)	1.04 (0.54)	7.28 (2.19)
10	1.22 (1.54)	2.48 (1.60)	-0.18 (-0.22)	1.01 (0.43)	10.74 (1.63)	1.22 (2.81)	2.48 (2.81)	-0.18 (-1.93)	1.01 (0.24)	10.74 (3.80)
11	0.32 (0.38)	1.42 (1.12)	1.33 (0.53)	0.92 (0.49)	13.48 (1.94)	0.32 (0.65)	1.42 (3.01)	1.33 (1.12)	0.92 (0.80)	13.48 (8.53)
12	-0.06 (-0.09)	0.78 (0.47)	1.53 (0.22)	-0.14 (0.01)	16.12 (1.97)	-0.06 (-0.42)	0.78 (0.39)	1.53 (1.69)	-0.14 (-0.92)	16.12 (7.55)
13	-0.53 (-0.38)	-0.05 (0.05)	-2.57 (-0.88)	0.1 (-0.12)	23.38 (2.93)	-0.53 (0.25)	-0.05 (0.25)	-2.57 (-1.89)	0.1 (-0.28)	23.38 (3.47)
14	-0.38 (-0.78)	-1.00 (-0.81)	0.6 (0.10)	0.94 (-0.24)	13.98 (1.64)	-0.38 (-1.14)	-1.00 (-2.82)	0.6 (-2.49)	0.94 (-1.14)	13.98 (-0.13)
15	-0.14 (-0.18)	-0.17 (0.02)	-1.11 (-0.32)	-0.25 (0.00)	23.85 (2.60)	-0.14 (-1.05)	-0.17 (-0.53)	-1.11 (-2.61)	-0.25 (-2.35)	23.85 (4.15)
16	0.25 (0.37)	1.99 (1.38)	3.99 (1.02)	3.5 (1.41)	18.01 (2.22)	0.25 (2.05)	1.99 (6.47)	3.99 (4.36)	3.5 (7.10)	18.01 (12.57)
17	0.57 (0.60)	-0.03 (0.24)	-1.04 (0.12)	0.26 (0.00)	14.31 (0.81)	0.57 (0.06)	-0.03 (0.06)	-1.04 (0.06)	0.26 (0.59)	14.31 (1.10)
18	0.26 (0.74)	0.83 (0.90)	1.14 (0.38)	0.77 (0.64)	13.33 (2.31)	0.26 (2.64)	0.83 (1.90)	1.14 (-0.61)	0.77 (0.72)	13.33 (8.70)
19	0.51 (0.97)	1.88 (1.88)	2.99 (0.86)	1.74 (1.00)	16.71 (3.03)	0.51 (2.01)	1.88 (2.90)	2.99 (-0.00)	1.74 (-0.1)	16.71 (5.42)
20	-0.18 (-0.15)	0.44 (0.52)	0.53 (0.07)	0.55 (0.27)	3.76 (0.71)	-0.18 (-0.07)	0.44 (1.34)	0.53 (0.99)	0.55 (0.63)	3.76 (0.99)

losses to get into the positive zone. These results were mostly significant even after controlling for the event clustering and event-induced variance effects—especially for the sectors like Paper & Print, Pharma & Chemical, and Textiles.

## 5. Conclusion

Views on the effects of Demonetization on the Indian economy differ widely and reflect ideological differences, with those in favour, for whatever reason, anticipating positive effects, and vice versa. Though the implications of such a decision would reflect in long-term—the short-term reaction of the stock market to Demonetization provides early indicators as to what the effects have been or was anticipated to be.

The results presented in this study, on the basis of the event study methodology, confirm the proposition that Demonetization have varying sectoral effects, although most sectors reacted negatively as indicated by negative ARs in the early days; however, the trend reversed in the medium term—next two months of trading ~40 days post event window. As expected, the banking and finance sector was the worst affected while the certain sectors like IT/ITES, Pharma and consumer durables witnessed a windfall gains in the early days which continued in the event window period. Surprisingly sectors like Travel & Tourism did not get affected adversely despite early hiccups. While from the firms' affiliation perspective PSUs looked to be mostly shielded by the adversaries of the cash crunch while Group Affiliates, which are considered to have superior bargaining power in their upstream and downstream because of their diversification benefits and interlinks of the group affiliated firms and subsidiaries, surprised with the most negative CAAR on the event day and event window period which could recover the least till the next 40 days of trading amongst others.

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## Notes

1. Market Model is the most commonly used method for predicting normal returns Strong (1992)—which has been primarily used in our study, followed by multifactor models—Fama and French (1993) adjusted, or Fama-French-Carhart adjusted returns, where Carhart refers to the Carhart (1997) momentum factor.
2. Assumptions are: market return is not correlated with the error term, while no two firms' returns are auto-correlated and have equal residual variance.
3. BSE CNX 500 cover broad-based 500 stocks from 20 major industries, which accounts for more than 90% of the market capitalisation of BSE.
4. **Choices on the estimation and event windows:** Various event studies have used event windows ranging from 30 days to 750 days, depending upon the availability of the data. Any estimation window that ranges over 100 days provides estimates that are less sensitive to the number of days in the window (Armitage, 1995, Park, 2004). We, therefore, take an estimation window of 200 days, starting from -21 before the event to -221 days. We select an event window of 11 days, -5 to +5, which has been used by many prior studies.
5. India's oldest Stock Exchange with the maximum number of listed firms.
6. These are little different from the sectoral indices available at major stock exchanges. However, the major sectoral indices do not cover all the sectors and industrial cluster. Thus we follow the more detailed NIC code to divide the listed firms into major sectors.

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