Demonetisation from the Perspective of Indian Stock Market[*]

Dr. Munmun Mohanty[1], Dr. Sanjib Pattnaik[2]

[1] Associate Professor in Finance at School of Management Studies, Ravenshaw University, Cuttak, Odisha. EMail:dr.munmun.mohanty@gmail.com
[2]Associate Professor in Finance at School of Management Studies, Ravenshaw University, Cuttak, Odisha. Email:dr.munmun.mohanty@gmail.com
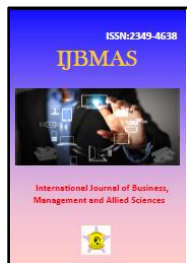
ABSTRACT

The Indian economy in recent times has seen a lot of disruption, demonetisation being the foremost of them all. The unprecedented scale of India's demonetization makes it difficult to predict its effects. As of now the economy is still struggling to get back on its normal course of growth and the government is still facing criticism from many quarters, both inside India as well as international community for this action. Although the scale of the event makes it very complicated to study the reaction without having to worry about the cross-correlation, we are trusting on the fact that the stock market participants, however miniscule they might be, are very informed and have great financial motivation to predict the impact. The present study uses the daily returns data of all the fifty companies listed in NSE Nifty as on the date of the event to assess the reaction of stock market to the announcement of demonetisation using the event study methodology. To study the sectoral impact on various industries we have used a dummy variable regression. The results are startling in the sense that we gain an insight into the prevalence of unaccounted for cash into industries like cement and automobiles, which were traditionally known not to deal with cash. These sectors have reported significantly negative returns across several event windows. The banking sector contradictory to the belief has not performed in outstanding manner as the positive returns have been nullified beyond 5 days of the event. Thus indicating that the sudden surge in deposits of the bank are transient and were done to meet the government regulation. These deposits did not increase the financial depth. The reaction of other sectors like Pharmaceuticals, telecom, software, oil and natural gas, coal and power and the diversified sector were as per our expectation without any major shocks.

Key Words: Demonetisation, Event Study, dummy variable, unaccounted cash, Sectoral impact

1. Introduction

The Indian economy in recent times has seen a lot of disruption, demonetisation being the foremost of them all. The Prime Minister of India, in his televised declaration of demonetisation, had announced that

---

[*] *This paper was presented at ISFIF 2017 at IIT Kaharagpur*

the government was going to implement a major change in the economic environment by declaring the high value currency notes – of Rs 500 and Rs 1000 denomination no more as legal tenders. The news became public after the closure of business on November 8, 2016 and the notes ceased to be legal tender from midnight of the same day. People were given up to December 30, 2016 to exchange the notes held by them. This announcement created ripples across all sector of the society as there is a tiny part of India where most activities can be done without cash. The rest of India uses cash for effecting transactions. This includes some activities of the formal sector and it includes all transactions in the informal sector. In fact 90% of all transactions in India are cash based[1]. Financial sector reforms have made little progress in the fields of banking and payments. As a consequence, currency notes continue to dominate transactions. The share of electronic transactions in total transactions in India is the lowest in the world. The size of cash relative to GDP is the highest in the world. In fact on the day of announcement of the total cash in circulation in the economy, roughly 86% by value was held in Rs.500 and 1000 denomination. The country faced severe cash shortages with severe detrimental effects across the economy. People seeking to exchange their bank notes had to stand in lengthy queues, and several deaths were linked to the rush to exchange cash.

However the immediate financial impact of announcement was visible the very next day when the BSE SENSEX and NIFTY 50 stock indices fell over 6 percent on the day after the announcement. BSE SENSEX crashed nearly 1,689 points and NIFTY 50 plunged by over 541 points In the days following the demonetisation, to reach an around six-month low. Of course, the stock market's reactions were just the earliest assessments of demonetization's likely effects. The unprecedented scale of India's demonetization also makes it difficult to predict its effects. As of now the economy is still struggling to get back on its normal course of growth and the government is still facing criticism from many quarters, both inside India as well as international community for this action. The actual effects will become clearer as time progresses and more data becomes available. However the initial stock market reactions remain valuable as a guide. The predictions of stock market investors may, of course, turn out ultimately to have been mistaken. Although in India, a very small portion of investors are active in the stock market, they are active risk takers and analyze the market in minutes detail and have strong financial incentives to predict these effects correctly. Hence this paper aims to understand the stock market reactions as a first draft of the story of the impact of this policy, and its wider implications for understanding the significance of cash transaction on specific sectors.

The rest of the paper is organised into four sections. In the next section we will be discussing the history and the possible reasons behind the drastic policy decision. The third section will be devoted to a discussion on the possible consequences of the said decision on various sectors in the economy. The announcement of what has come to be known as "demonetization" was very much a surprise, and provides a rare opportunity to not only test the effects of this particular initiative but also to derive more general insights into the significance of cash in various sectors of economy. Hence we decided to conduct an event study around the November 8, 2016 announcement, analyzing stock market reactions for different sub-samples of Indian firms defined by industry. The next three sections will be devoted to description of data and methodology, analysis of results and conclusion.

2.   Background of Demonetisation

The word 'Demonetize' was first used by the French in the years 1850 – 1855. Later on the word was adopted by the rest of the world, particularly those nations who changed their currencies in some way. The nations used the term with restrictions and discomfort while changing the denominations of currencies as it disrupts economies and population at large.

2.1   Demonetisation in India

There has been ample proof of money being used as a medium of exchange in Ancient Indian subcontinent. The evidence of coins belonging to the 7th century BC were issued by small states and traders, punched with natural symbols like sun, trees and hills, supports the claim further. However, the nature of coins and their appearance changed as time passed by and ruling dynasties changed. The most glaring evidence of demonetisation can be traced back to 14th century AD, when Mohammed Bin Tughlaq changed the gold coins to tokens of copper and brass. Again, in 16th century AD, Sher Shah Suri introduced gold (mohur), silver (rupiya) and copper (dam), withdrawing the existing currencies.

After the establishment of Reserve Bank of India in 1st April 1935, the institution for issuance and policies of Indian currencies, the nation has faced demonetisation thrice. The first instance was on 12th January, 1946, when it was announced that notes of Rs. 500, Rs. 1000 and Rs. 10,000 will not be legal tenders. This was done in order to curb black money. The second instance on 16th January 1978, the government under the leadership of Morarji Desai, banned notes of Rs. 1000, Rs. 5000 and Rs. 10,000, with the intention to curb black money and counterfeits in the economy.

On 8th November 2016, the Government of India announced the demonetisation, commonly called 'Notebandi', of all ₹500 and ₹1,000 banknotes of the Mahatma Gandhi Series. This was done to curtail shadow economy and crack down on the use of illicit and counterfeit cash that fund illegal activity and terrorism. As an aftermath of the unexpected and sudden announcement of the demonetisation, cash shortages in the following weeks created chaos in the economy.

2.2 Motives for 2016 Indian Demonetisation

The sudden announcement of demonetisation on 8th November 2016 by the Government of India caught the public unaware and unprepared. But the policy makers and the government went ahead with their plan of action. This massive exercise was undertaken for the betterment of the India as a State and its Economy.

India as an independent state has always faced cross-border terrorism, naxalite activities and illegal activities. These are mainly financed by counterfeit notes of ₹500 and ₹1,000. As a result of demonetisation, it was expected that the supply of counterfeits will stop for anti-national activities.

The demon of corruption has grasped the Indian society for ages. This is facilitated by unaccounted cash i.e., black money, particularly the notes of ₹500 and ₹1,000, which were stashed away in form of cash, buying real estate properties, donations for education. The demonetisation move was intended to unearth black money and curb corruption.

Another important reason for demonetisation was to make the Indian Economy move towards a cashless society. The move was intended to maximize electronic fund transfers and usher a transparent and digital economy.

3. Impact on Various Sectors[2]

During the announcement of demonetisation, the proposal by the government involved the elimination of the existing notes from circulation and a gradual replacement with a new set of notes. In the short term, it was intended that the cash in circulation would be substantially squeezed since there were limits placed on the amount that individuals can withdraw. In the months to come, this squeeze was to be relaxed somewhat. Hence there were some immediate ripples across industry and also several predictions regarding the future scenario of the economy in general as well as specific sectors of economy. We have highlighted here the immediate response of the financial press during the first few weeks of the announcement.

3.1 AUTO

It was expected that demand would dip for a couple of months for two-wheelers, but passenger vehicles and tractors will be less impacted. In the two-wheeler industry, around 35-45% purchases are made via financing, while the rest are though banked cash, or are simply "unaccounted". But in the passenger vehicles segment, close to 75%-80% of sales are either through financing, or even down payments are made mostly by cheques -so this segment could face less heat. As for tractors, close to 65% of the purchases are financed, therefore the impact of cash squeeze could be minimal.

3.2 CEMENT

There was an indication from companies and dealers that volumes may get impacted in the near-term as real estate demand (which is 55-60% of overall demand), especially in tier 2 and 3 cities, may get affected in the interim. Demand in tier-1 cities was already weak for the past 2-3 years. But infrastructure demand, backed by government spending which has been driving growth, is unlikely to be impacted.

3.3 CAPITAL GOODS

The impact was not expected to be big largely due to the B2B nature of business. However, payment to sub-vendors may face some liquidity issues.

3.4   BANKS

The move towards a cashless economy will boost savings in financial assets. With any sharp infusion of deposits and relatively limited avenues to lend, the credit deposit ratio for banks would become unfavourable, and thus impact margins. In case of a spike in capital adequacy, it would be positive for margins. While in the event of a higher rise in deposits, the immediate avenue to deploy would be G-Secs, and this could create a temporary downward blip in bond yields. Thus some of banks could see windfall gains on treasury.

3.5   CONSUMER STAPLES / JEWELLERY

The move is good for the organised industry. But in the short term, it may impact the working capital in FMCG distribution. Anecdotally, there's always a huge panic among distributors -business may be impacted in the short term with liquidity choking up, thereby impacting FMCG revenue growth. There will be a shift from unorganised to organised sector in the jewellery industry.

3.6   TELECOM

There's no material impact as average transaction size is very small. However, slowdown in smart phone sales could potentially slower adoption of mobile broadband subscriber penetration.

3.7   PAINTS

Paint companies which are into big project sales, deal in cash component worth 30-40% of sales, while for shops which have higher retail sales, cash component could be 70-80%.Therefore, paint companies could face fall in sales in the short term.

3.8   POWER & COAL

A possible fall in the interest rate will be positive for yield players. Coal prices have risen recently, with China cutting domestic production. With Trump focusing on US competitiveness, there's a good chance that China will reciprocate allowing coal prices to fall again.

4.   Research Hypothesis

Demonetisation coincided with the US presidential election results announced on November 8, 2016. The victory of Donald Trump amplified concerns surrounding more protectionist trade policies in the US, on top of expectations of tightening of US monetary policy, and possibly looser US fiscal policy. Reflecting these developments, the Indian equity market plummeted, with the BSE Sensex declining by 3.5 percent (up to December 30, 2016) from its level on November 8, 2016 (Chart 8). Disappointing quarterly earnings results from some blue-chip companies also impacted the equity market. Since the US presidential election results were also announced on November 8, 2016, it would be difficult to disentangle the specific impact of the demonetisation and the US Presidential election results on the Indian capital market.

Although the equity market was affected by both domestic and global factors, the impact of demonetisation alone can be gauged from the movement in indices of cash sensitive sectors such as FMCG, consumer durables, auto and realty vis-a-vis the overall index. Although corruption and tax evasion were the issues most discussed by the government and the media in relation to demonetization, there are other effects to consider. For example, stock market reactions may vary across industries because corruption due to prevalence of cash transaction is more prevalent in certain sectors. To the extent that demonetization is anticipated to reduce cash transaction, firms in these sectors may be harmed because corrupt payments can no longer be used to evade burdensome regulations. Hence we have conducted an event study on November 8, 2016 to gauge the impact of demonetisation on various sectors.

5   Data and Methodology

5.1   Data

The present study uses the daily returns data of all the fifty companies listed in NSE Nifty as on the date of the event to assess the reaction of stock market to the announcement of demonetisation. The daily share prices and the Nifty values were downloaded from the national stock exchange website, www.nseindia.com. The daily returns were computed using the simple holding period return formula. The Nifty stocks represented a total of 20 industries. However for the sake of our study and construction of portfolio, these stocks have been grouped into 9 sectors for further analysis namely: Telecom, Cement, Pharmaceuticals, Automobiles, Banking and Financial Services, Software, Oil and Power and Others. The

differential impact of the demonetisation announcement on these sectors of Indian economy has been studied separately. The data regarding industry classification has been obtained from moneycontrol.com, a popular website dealing with financial data.

For our study we have used a non-overlapping estimation window and an event window. The estimation window has been chosen as the period from September 2015 to August 2016 for estimating the a and β parameters of all the companies under study. The event window considers 9th November 2016 as the day zero. Though the announcement was made on 8th November, it was only done after the closure of business on that day. Hence to judge the impact of the event, the next day is taken as the zero day. We have considered event windows of several lengths for gaining insight into the impact, they are: t ± 1 day (3 day window), t ± 2 day (5 day window), t ± 3 day (7 day window), t ± 4 day (9 day window), t ± 5 day (11 day window) , t ± 7 day (15 day window) and t ± 7 day (31 day window).

5.2   Research Technique

Finance theory suggests that stock prices reflect all available information about the prospects of firms. Given this basic premise, one can study how a particular event changes a firm's prospects by quantifying its impact on the firm's stock price. Conceptually, event study analyses difference between the returns that would have been expected if the analyzed event would not have taken place (normal returns) and the returns that were caused by the respective event (abnormal returns). The different analytic techniques for estimating abnormal returns differ with respect to the model used for predicting the normal returns around the event date.

We have used the 'market model' according to Brown and Warner (1985)[3] methodology. It builds on the actual returns of a reference market and the correlation of the firm's stock with the reference market. Equation (1) describes the model formally. The abnormal return on a distinct day within the event window represents the difference between the actual stock return (R_{it}) on that day and the normal return, which is predicted based on two inputs; the typical relationship between the firm's stock and its reference index (expressed by the a and β parameters), and the actual reference market's return (R_{mt}).

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \qquad (1)$$

Typical abnormal returns associated with a distinct point of time before or after the event day are defined as follows.

$$AAR = \frac{1}{N} \sum_{i=1}^{N} AR_{it} \qquad (2)$$

To measure the total impact of an event over a particular period of time (termed the 'event window'), we have added up individual abnormal returns to create a 'cumulative abnormal return'. Equation (3) formally shows this practice.

$$CAR_{t_k - t_j} = \sum_{t=t_k}^{t=t_j} AR_{it} \qquad (3)$$

Following general principles of inferential statistics, the *null hypothesis (H₀)* thus maintains that there are no abnormal returns within the event window, whereas the *alternative hypothesis (H₁)* suggests the presence of ARs within the event window. Formally, the testing framework reads as follows:

$H_0: \mu = 0$

$H_1: \mu \neq 0$

A simple test for testing $H_0: AAR = 0$ is given by

$$t_{AAR_t} = \sqrt{N} \frac{AAR_t}{S_{AAR_t}} \qquad (4)$$

Where, S_{AAR_t} is the standard deviation across firms at time t:

$$S^2_{AAR_t} = \frac{1}{N-1} \sum_{i=1}^{n} (AR_{i,t} - AAR_t)^2 \qquad (5)$$

Test statistic for testing $H_0: CAAR = 0$ is given by

$$t_{CAAR} = \sqrt{N} \frac{CAAR}{S_{CAAR}} \qquad (6)$$

Where, S_{CAAR} is the standard deviation of the cumulative abnormal returns across the sample.

$$S^2_{CAAR_t} = \frac{1}{N-1} \sum_{i=1}^{n} (CAR_{i,t} - CAAR_t)^2 \qquad (7)$$

To test the differential impact of the event across various industries it is important to test the contribution of various industries beta to the CARs of overall portfolio beta. Hence a straight forward dummy variable OLS regression could be run to assess this impact[4] (Dharmapala and Khanna, 2017). Accordingly the following regression equation is used:

$$CAR_i = \alpha_i + \sum_{j=1}^{k} \beta_j \, I_{ij} + \epsilon_i \qquad (8)$$

Where, CAR_i is the CAR computed for firm i around the event date, as described above, and α is a constant. For each of k different industries, I_{ij} is a dummy variable that is equal to one if firm i belongs to industry j, and is zero otherwise. For instance, we focus on specific industries of interest, such as Telecom, Cement, Pharmaceuticals, Automobiles, Banking and Financial Services, Software, Oil and Power and Others.

6.   Results and Discussion

The table 1 reports the average abnormal returns of the equally weighted portfolio of Nifty stocks in an event window of t ± 15 days. The column next to the reported values of AARs is the cumulative AARs, mentioned in the table as TAARs (This has been done with the purpose of distinguishing the CARs from the cumulative AARs). It can be seen that the t-values report a significant value at 5% level for most of the days post announcement date. This indicates a significant impact of the announcement on the investor psyche. The sectoral reaction to this announcement has been reported as the AARs in Table 2 and pictorially in the graph 1- graph-9, one each for each of the nine sectors.

Table 1: the AARs and the t-Values around the event date

Event date	AAR	TAAR	S_{AARt}	T-value
-15	0.00332	0.00332	0.013684	1.715492
-14	0.00303	0.00635	0.012976	1.651074
-13	-0.00026	0.006086	0.01316	-0.14164
-12	-3.3E-05	0.006053	0.016151	-0.01464
-11	0.000944	0.006996	0.018908	0.352914
-10	-0.00401	0.002983	0.021544	-1.3174
-9	-0.00659	-0.00361	0.018862	**-2.47022***
-8	0.002052	-0.00156	0.016001	0.906651
-7	0.000509	-0.00105	0.006946	0.518249
-6	0.002442	0.001396	0.016156	1.068561
-5	-0.00755	-0.00615	0.018813	**-2.83742****
-4	-0.00319	-0.00934	0.016937	-1.33049
-3	-0.00723	-0.01657	0.023517	**-2.17484***
-2	0.006285	-0.01029	0.020656	**2.151***
-1	0.002632	-0.00766	0.016241	1.146109
0	-0.00597	-0.01363	0.025299	-1.66852
1	0.011131	-0.0025	0.033428	**2.35456***
2	-0.01686	-0.01935	0.027963	**-4.26215****
3	-0.01278	-0.03213	0.039363	**-2.29498***
4	-0.00064	-0.03276	0.020817	-0.21595
5	-0.00189	-0.03466	0.016572	-0.80849
6	0.00338	-0.03128	0.015059	1.586861
7	-0.01296	-0.04424	0.026618	**-3.44249****
8	0.006105	-0.03813	0.014412	**2.995497****
9	0.005782	-0.03235	0.016035	**2.549643***
10	-0.00176	-0.03411	0.01881	-0.66142
11	0.006685	-0.02742	0.01907	**2.478722***
12	0.004664	-0.02276	0.017646	1.868764

13	0.004961	-0.0178	0.015938	**2.201051***
14	0.00375	-0.01405	0.011467	2.31258
15	-0.00384	-0.01789	0.018549	-1.4656

Values significant at 5% level
Values significant at 1% level

Table 2: the AARs and of the various sectors around the event date

Event date	AAR							
-15	Bank	Automobile	software	Pharma	cement	Telecom	oil&coal	Others
-14	-0.024	-0.043	0.030	0.043	0.005	0.062	0.034	0.015
-13	0.076	-0.028	-0.027	-0.014	-0.004	0.058	0.014	0.084
-12	-0.013	0.004	0.068	-0.010	-0.030	0.018	0.009	-0.044
-11	0.031	0.048	-0.079	0.008	-0.003	-0.032	0.105	-0.080
-10	0.001	-0.038	-0.014	0.050	0.018	0.028	-0.035	0.046
-9	-0.088	-0.033	-0.042	-0.025	-0.009	0.051	-0.002	-0.031
-8	-0.022	-0.108	-0.060	0.039	-0.020	-0.040	0.002	-0.093
-7	0.052	0.062	0.022	-0.002	-0.001	-0.052	-0.005	0.053
-6	-0.021	-0.017	0.029	0.036	-0.008	0.017	0.010	-0.004
-5	-0.011	0.081	-0.041	-0.044	0.021	0.019	0.026	0.050
-4	-0.042	-0.068	-0.019	-0.073	-0.022	-0.010	-0.061	-0.089
-3	-0.029	-0.009	-0.024	-0.044	0.017	0.034	-0.056	-0.042
-2	-0.048	-0.031	0.085	-0.229	-0.016	-0.062	-0.027	-0.004
-1	0.089	-0.042	0.027	0.128	0.009	-0.016	0.024	0.100
0	0.033	0.124	0.013	-0.074	0.019	0.008	0.029	-0.015
1	0.071	-0.173	-0.123	0.124	-0.091	-0.003	0.034	-0.113
2	0.254	-0.157	-0.029	0.080	0.008	0.098	0.071	0.180
3	-0.098	-0.263	-0.043	0.005	-0.073	-0.097	-0.043	-0.182
4	-0.040	-0.306	0.095	0.002	-0.099	0.046	-0.005	-0.303
5	-0.026	0.050	0.082	-0.125	-0.029	0.002	-0.045	0.021
6	0.026	-0.015	-0.060	0.026	-0.046	-0.046	0.008	0.007
7	-0.009	0.098	-0.001	0.067	0.042	0.023	0.001	-0.095
8	-0.233	-0.201	0.049	-0.023	-0.027	0.027	-0.016	-0.159
9	0.032	0.115	0.025	0.013	0.029	0.007	-0.001	0.105
10	-0.044	0.021	0.009	0.086	0.018	0.018	-0.012	0.173
11	-0.037	-0.089	0.072	-0.058	0.035	-0.003	-0.025	-0.019
12	0.024	-0.080	0.199	0.132	-0.008	0.000	0.026	0.047
13	-0.126	0.063	-0.005	0.009	0.006	0.112	0.044	0.070
14	-0.043	0.194	-0.020	0.002	0.011	0.083	0.026	0.026
15	0.114	0.026	-0.009	-0.021	0.036	-0.014	-0.006	0.034

It is interesting to note that on the +1 day of the event the automobile sector has registered the sharpest fall with a return of -17% followed by software with a return of -12%. At the same time the highest return has been reported by pharmaceutical sector with a return of 12% followed by banking and financial sector at 7%. A further perusal of the table and graphs reveal that the automobile portfolio has continued to

generate negative returns well into the next fortnight, whereas the software portfolio has bounced back to pre-announcement level merely 3 days after the announcement. The reasons for the behaviour of the software industry could be interpreted from the fact that on the 8th November 2016, two very significant announcements were made. One was the demonetisation and the other was the declaration of US presidential election. The Trump win came as a surprise to many and there is every reason to believe that this contributed more to the Indian software sector's negative reaction around the event date than the demonetisation announcement. It was widely publicised that Trump administration was in favour of protectionist business regime giving the foreign companies a lot of nightmare. More so the visa rules were going to be stiffer, particularly affecting the Indian software sector. Since the immediate impact of demonetisation was on the cash and cash dependent industry, it could be safely assumed that the reaction of the software sector was mainly due to the news from abroad. However the immediate fears were mitigated and the stock market could fully absorb the announcement in a short span of 3-4 days. The automobiles sector however catches our attention due to continued negative and significant returns. This leads us to believe that cash played a major role in the sector and that the majority of this could be unaccounted simply due to the fact that reduction in temporary money supply has led to severe erosion of short term market capitalisation.

The returns of pharmaceutical sector have been as per the expectations mentioned in the earlier section. The fact that the pharmaceutical industry is a defensive one, i.e. does not get affected by business cycle, has contributed to the countercyclical behaviour of the pharma portfolio. Further it was made clear in the demonetisation announcement[5] that the pharmaceutical and the hospital sectors were allowed to accept old notes making the cash crunch situation less critical for this industry.

Because the demonetization process entailed large deposits in the banking system, it is possible that banks are particularly affected by the November 8 announcement. In particular, if it were anticipated that a substantial fraction of the deposits would not be immediately withdrawn upon remonetisation, then the banks would have additional net deposits that could potentially be lent out and generate returns. On the other hand, the demonetization was, as previously described, accompanied by a remonetisation; thus, it is possible that the increase in deposits would be purely transitory, with similar amounts being rapidly withdrawn upon the availability of the new notes. In this latter scenario, no major impact on banks' profitability would be expected. The banking and financial services industry has responded with huge positive returns for the first three days of the event. However beyond the 7 day event window, the banking returns have also moved towards the negative side, confirming our latter logic. Related to this, the industries that are more dependent on the type of financing banks provide stand to benefit too because their capital constraints have been eased when banks have more funds available to lend. Industries which are more dependent on external finance than others (e.g., pharmaceuticals and automobiles)(Rajan and Zingales, 1998)[5] are the ones most likely to benefit from this. In addition, industries that thrive in online environments are also likely to benefit. Though the pharmaceutical industry conforms to our hypothesis, the automobile sector differs significantly from this confirming the prevalence of unaccounted for money in the sector.

To study the contribution of various sectors to the aggregate CARs we have used the dummy variable regression as mentioned in equation 8. The I_J in the equation is the dummy which took a value of 1 if the company belonged to industry J and value of 0 otherwise. The study included all the nine industries into which we had divided our Nifty sample. The Regression was run independently for different window periods like $t \pm 1$ day (3 day window), $t \pm 2$ day (5 day window), $t \pm 3$ day (7 day window), $t \pm 4$ day (9 day window), $t \pm 5$ day (11 day window), $t \pm 7$ day (15 day window) and $t \pm 7$ day (31 day window). We would like to point out here that the event study is typically done in a small window like 3 day, 5-day or 7 day. However we have included some bigger size windows to be able to see the stock market reaction to the gradual removal of control over the cash withdrawal. The results of the regression test are reported in table 4 – table 10.

It appears that investors anticipated at the time of demonetization that the profits of banks would be positively affected. This is evident from the huge positive AARs of the banking industry reported earlier. This entails an expectation that demonetization would result in a persistent (rather than transitory) increase

in financial sector deposits. Indeed, the observed reaction requires that the market believed that demonetization would lead to a substantial and persistent shift in the form of savings by the public in India, specifically from unaccounted-for cash to bank deposits. Of course, the announcement was expected to lead (as it in fact did) to a massive inflow of new deposits at banks. However, an explanation in the erosion of BFS equity, visible from the negative returns after 3 days of the event, is that these deposits were expected to be withdrawn (or otherwise used for consumption, for instance through electronic payments) in the short-to-medium term. This scenario would not enable banks to increase lending or other profitable activities. A perusal of all the tables for the beta values of banking industry reveals that the contribution of banking to the aggregate CAR is highest in the immediate event window i.e (-1,+1). The reported beta of BFS sector is 0.513 which is highly significant. However as the event window becomes wider the contribution of BFS sector to CAR (in comparison to other industry) is gradually reduced. This leads us to conclude that the market belief of the sudden increase in bank deposits is a temporary phenomenon is correct. The general reaction of the market was that BFS sector will not be able to mobilise the temporary deposits and may not generate any additional profitability out of it contributes to the results we obtained in the AARs (Negative returns on BFS portfolio).

The next sector to show a distinctive trend is the automobile industry. The sector reported a beta value of 0.474, second highest after BFS sector, which also significant at 1% level. A perusal of all the tables from 4-10 reveals a startling fact that the automobile sectors contribution to the CAR, represented by the beta value, has increased in a linear fashion to reach a highest value of 0.611 in the 15 day window (-7,+7). In all the event windows the beta values reported by the automobile industry is highly (1%) significant. This sector is the most important one contributing to the negative CARs of the diversified portfolio. It is not difficult to see that the industry's poor stock market performance was due to severe cash shortage due to demonetisation. Hence our suspicion that there is a wide circulation of unaccounted for cash in the sector stands vindicated.

The pharmaceutical sector true to its reputation of being a defensive industry has not reported any major deviations from the expectations. The beta values of the pharma industry have remained more or less constant throughout the study period.

As the US presidential election of November 8, 2016 has the potential to confound these effects (as discussed earlier in the Introduction), it is noteworthy that the information technology sector – which has close ties to the US and is potentially vulnerable to US trade and immigration policies – experiences only small (and statistically insignificant) market reactions. This reinforces our earlier point that it is unlikely that the US election would have a substantial impact in India at the industry level, even though it may well have affected the general level of the Indian market around this time.

At this point of analysis we feel it is important to devote a section to discussion of the results of the cement industry. The abnormal returns of the portfolio of the cement companies as reported in graph-5, depicts that the industry registered sharp fall until after 5 days of the event (11 day event window). This result confounds us as it is a widely known fact that cement is the basic input into infrastructure industry and the infrastructure industry remained more or less immune to the demonetisation. Hence there was no reason to believe that the cement industry would be as badly hit as it was. At this point it is also important to point out that the cement industry also acts as an input industry to the real estate sector. Real estate is often seen as one of the worst sectors in so far as tax evasion is concerned. As far as transactions in the real estate sector is concerned, it is understood that unaccounted-for cash is widely used in order to evade a tax known as "stamp duty" (e.g. Kulkarni, 2016)[7]. Real estate has long been the preferred choice of criminals for hiding ill-gotten gains, and manipulating property prices is one of the oldest known ways to transfer proceeds illegally between parties to a deal. Tax fraud schemes are often closely linked with these activities. Aside from manipulating transaction prices, the most common ways that these nefarious activities are carried out also involve using false IDs, not declaring transactions or gains, and using corporations to disguise the identity of those benefiting. A lack of effective government control on these nefarious activities ensures that the price and demand in the real estate sector do not follow any reasonable economic model. These sectors have traditionally been high price-high demand industries. These industries also fuel up the demand of the

dependent industries; cement being the foremost of them. It is a well known fact that the real estate industry was the hardest hit during the demonetisation. So it would not be out of place to assign the sharp decline in real estate demand due to demonetisation to the negative returns of the cement industry. This also confirms the prevalence of unaccounted cash in the real estate sector.

However to exactly study the relationship between the cement industry and the real estate sector, separate specific portfolios may be formed and necessary regression model may be designed. However we have kept this analysis out of the scope of this particular paper.
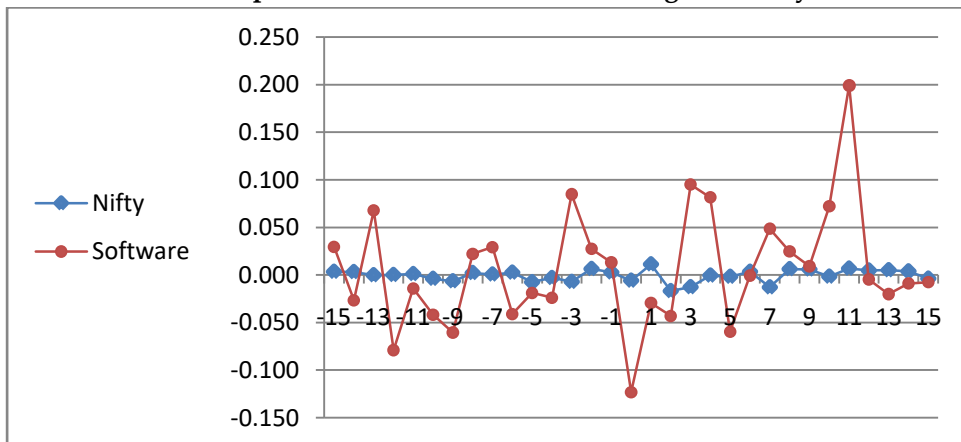
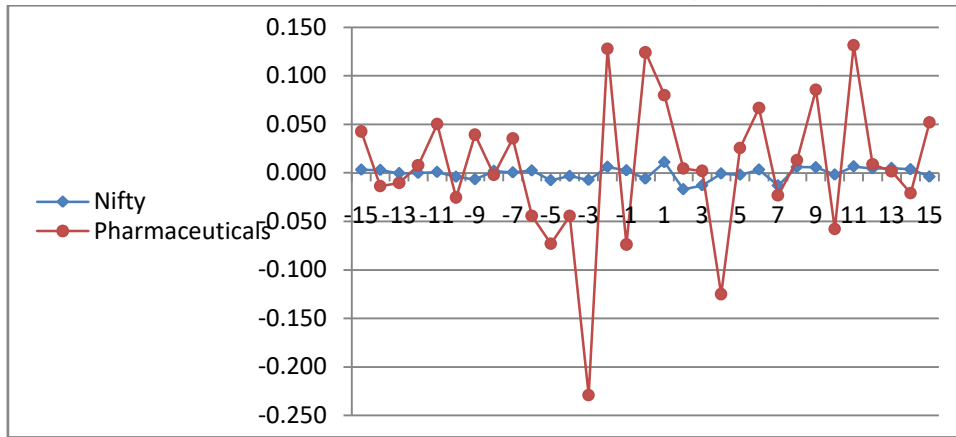**Graph-1: AAR of BFS Portfolio against Nifty**
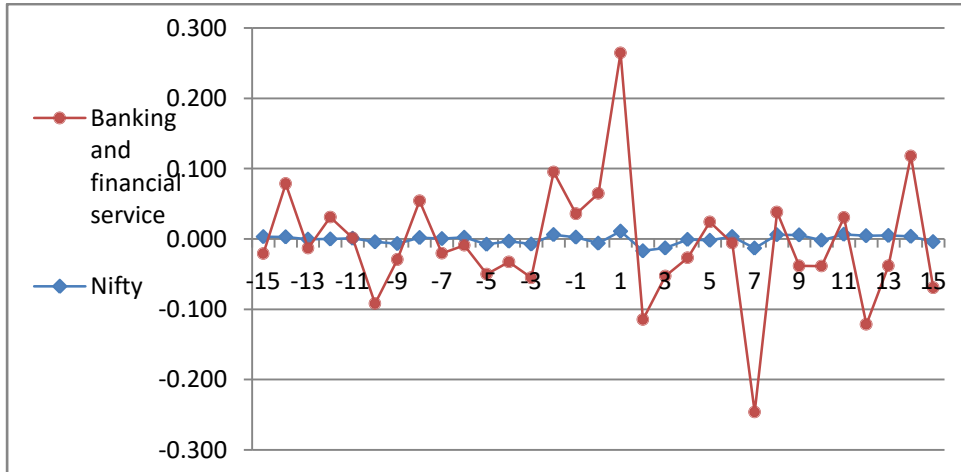
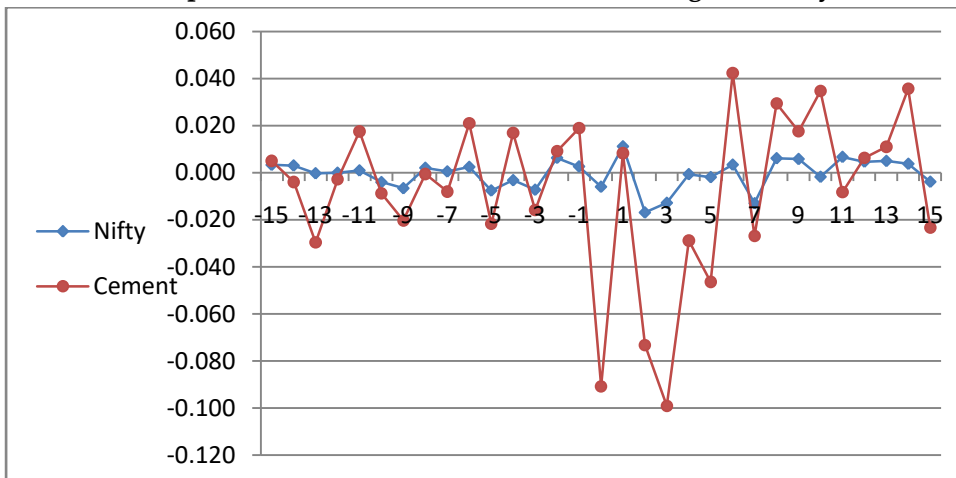**Graph-2: AAR of Automobile Portfolio against Nifty**
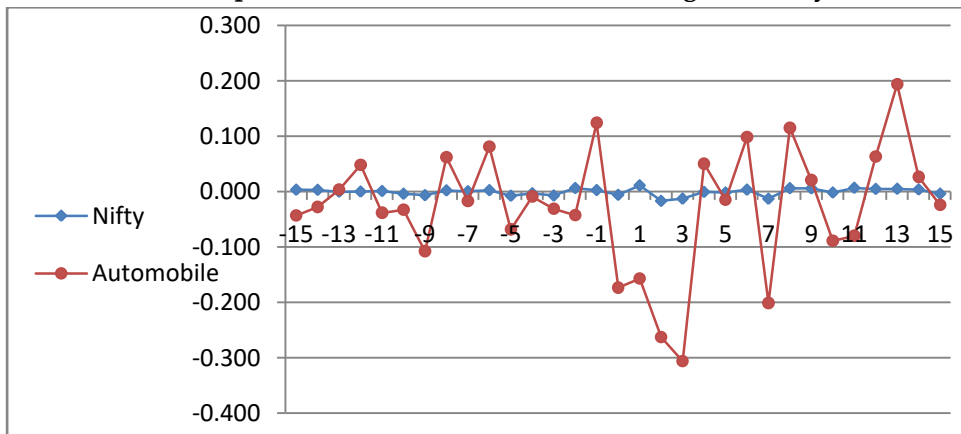
Graph-3: AAR of Software Portfolio against Nifty

Graph-4: AAR of Pharmaceuticals Portfolio against Nifty

Graph-5: AAR of Pharmaceuticals Portfolio against Nifty

Graph-6: AAR of Telecom Portfolio against Nifty
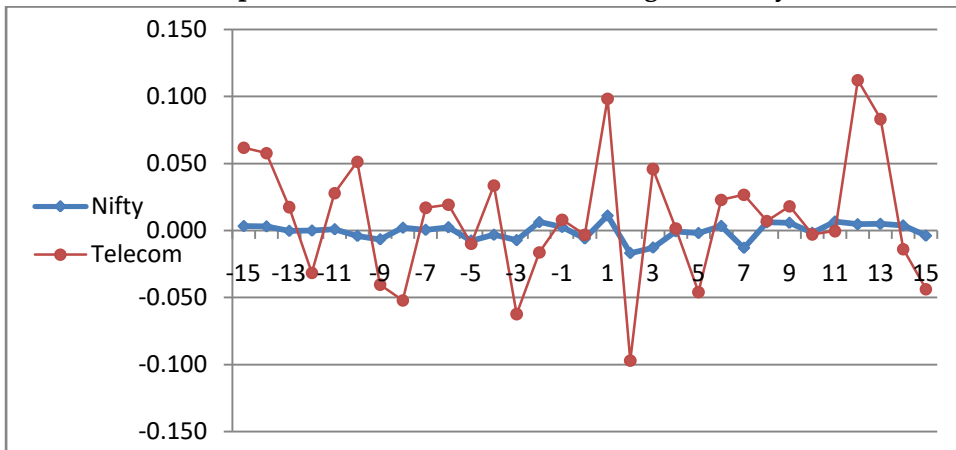
Graph-7: AAR of Oil and Coal Portfolio against Nifty
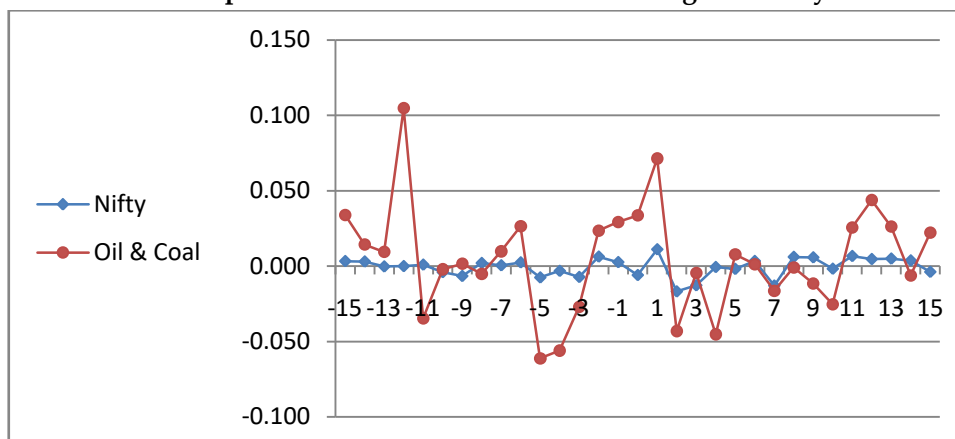
Graph-8: AAR of Others Portfolio against Nifty
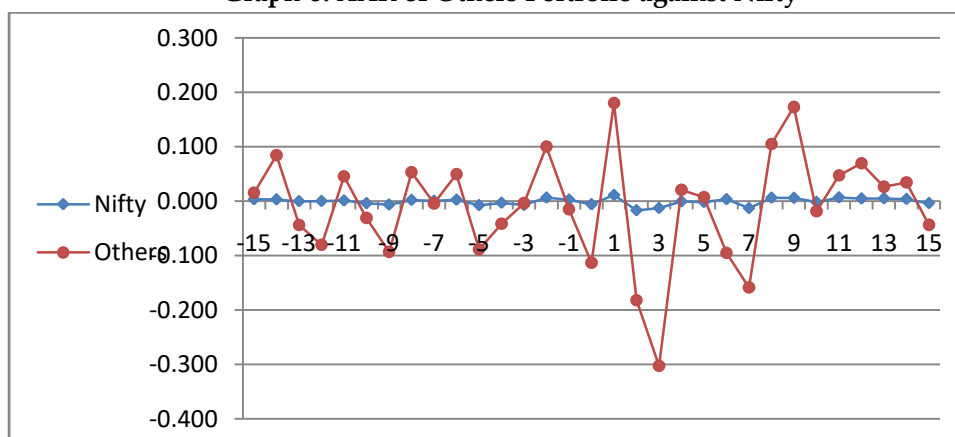
Table 3: the CARs and the t-Values across various event dates

Event Window	Mean CAR	SD of CAR	S_{AARt}	T-value
3-day (-1, +1)	-0.007794	0.043512	0.043954	**-3.253****
5-day (-2, +2)	-0.00278	0.057037	0.057616	**-2.340***
7-day (-3, +3)	-0.02279	0.074204	0.074958	**-2.149***
9 day (-4, +4)	-0.02661	0.067906	0.068595	**-2.742***
11-day (-5, +5)	-0.03605	0.07532	0.076085	**-3.350****
15-day (-7, +7)	-0.04268	0.074779	0.075538	**-3.995****
31-day (-15, +15)	-0.01789	0.094274	0.095231	-1.3286

*Values significant at 5% level

*Values significant at 1% level

Table 4: The summary statistics of CAR in 3-day Event Window

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.004	.002		1.644	.108
	Cement	1.102	.237	.199	4.652	.000
	Telecom	.954	.145	.280	6.597	.000
	Pharma	.921	.172	.229	5.348	.000
	Automobile	1.037	.093	.474	11.115	.000
	Banking and Financial Service	.902	.075	.513	12.020	.000
	Software	1.091	.181	.259	6.040	.000
	Oil and Natural Gas	.902	.232	.166	3.893	.000
	Coal and Power	.955	.146	.277	6.525	.000
	Others	.926	.149	.263	6.219	.000

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.963[a]	.927	.911	.0129931

Table 5: The summary statistics of CAR in 5-day Event Window

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.004	0.002		1.774	0.083
	Cement	1.054	0.106	0.282	9.958	0
	Telecom	1.058	0.448	0.066	2.362	0.023
	Pharma	0.94	0.096	0.28	9.829	0
	Automobile	1.043	0.06	0.502	17.525	0
	Banking and Financial Service	0.898	0.05	0.501	17.795	0
	Software	1.05	0.11	0.269	9.51	0
	Oil and Natural Gas	0.872	0.254	0.097	3.436	0.001
	Coal and Power	0.962	0.15	0.18	6.429	0
	Others	0.976	0.072	0.379	13.567	0

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.984[a]	0.968	0.961	0.011251

KY Publications

Table 6: The summary statistics of CAR in 7-day Event Window

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.003	.002		1.422	.163
	Cement	1.025	.061	.380	16.772	.000
	Telecom	1.185	.589	.045	2.012	.051
	Pharma	.953	.251	.085	3.794	.000
	Automobile	1.024	.040	.581	25.407	.000
	Banking and Financial Service	.917	.037	.562	25.082	.000
	Software	.991	.134	.166	7.406	.000
	Oil and Natural Gas	.934	.188	.112	4.975	.000
	Coal and Power	1.006	.107	.210	9.370	.000
	Others	.977	.060	.369	16.285	.000

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.990[a]	.979	.975	.0117375

Table 7: The summary statistics of CAR in 9-day Event Window

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.003	.002		1.291	.204
	Cement	1.026	.072	.419	14.295	.000
	Telecom	.968	.482	.058	2.007	.051
	Pharma	1.055	.166	.187	6.369	.000
	Automobile	1.029	.052	.584	19.693	.000
	Banking and Financial Service	.907	.050	.525	18.092	.000
	Software	.961	.174	.161	5.532	.000
	Oil and Natural Gas	1.011	.392	.075	2.578	.014
	Coal and Power	1.003	.121	.240	8.272	.000
	Others	.927	.069	.396	13.461	.000

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.983[a]	.966	.958	.0139182

KY Publications

Table 8: The summary statistics of CAR in 11-day Event Window

Coefficientsᵃ						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.003	.002		1.437	.158
	Cement	1.019	.048	.487	21.058	.000
	Telecom	1.024	.159	.148	6.440	.000
	Pharma	1.044	.114	.211	9.133	.000
	Automobile	1.024	.040	.593	25.416	.000
	Banking and Financial Service	.865	.046	.430	18.801	.000
	Software	.999	.137	.167	7.304	.000
	Oil and Natural Gas	1.034	.204	.116	5.061	.000
	Coal and Power	1.000	.088	.261	11.398	.000
	Others	.953	.048	.462	19.956	.000

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.989ᵃ	.979	.974	.0121836

Table 9: The summary statistics of CAR in 15-day Event Window

Coefficientsᵃ						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.001	.001		.917	.364
	Cement	1.005	.018	.471	54.326	.000
	Telecom	.996	.051	.167	19.468	.000
	Pharma	1.012	.051	.172	19.905	.000
	Automobile	1.006	.014	.611	69.699	.000
	Banking and Financial Service	.889	.021	.363	42.335	.000
	Software	.998	.038	.227	26.460	.000
	Oil and Natural Gas	1.014	.118	.074	8.614	.000
	Coal and Power	1.000	.033	.258	30.121	.000
	Others	1.012	.015	.571	65.553	.000

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.998ᵃ	.997	.996	.0045287

Table 10: The summary statistics of CAR in 31-day Event Window

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.002	.002		.732	.469
	Cement	1.009	.048	.392	21.020	.000
	Telecom	.986	.072	.254	13.598	.000
	Pharma	.991	.075	.246	13.271	.000
	Automobile	1.011	.039	.487	25.863	.000
	Banking and Financial Service	.847	.047	.336	18.123	.000
	Software	.990	.069	.265	14.267	.000
	Oil and Natural Gas	.981	.134	.136	7.329	.000
	Coal and Power	.990	.095	.194	10.468	.000
	Others	.893	.035	.470	25.339	.000

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.993[a]	.986	.983	.0122955

7.   Conclusion

The announcement of demonetisation by Government of India on November 8, 2016 was probably the most disruptive and dramatic measures used by any Government in recent times. It was done primarily with the purpose of tackling counterfeiting, corruption, tax evasion and terror funding. Although the effects of demonetization will take many more years to assess, stock market reactions around the announcement date provide a window into investors' expectations about the longer-term impact of demonetization on different sectors of the economy and on different types of firms. They also potentially provide insights into the phenomena of use of unaccounted for cash, corruption and the channels through which these are effected.

We have computed abnormal returns for firms on the Indian stock market around this event, and compared patterns of abnormal returns for different subsamples of firms defined by industry. We found that the stock market generated negative returns as a whole during the several event windows that we studied. The banking industry showed little evidence of stock reaction indicating that the investors did not believe in persistent increase in the form of savings from unaccounted-for cash to bank deposits – i.e. no increase in financial depth. Many other industries like Software, Telecom, Pharmaceuticals, Oil and Natural Gas, Coal and Power and the diversified industries did not show any peculiar reaction. The two sectors however, that stood out in our analysis were the automobile and the cement sector. The demonetisations announcement has been devastating for these two industries, at least in the short run, thus giving rise to the suspicion of role of unaccounted cash in these industries directly or indirectly.

There are however important caveats to discuss here. The sample under study is only the nifty stocks. A study involving all the traded companies in India may provide deeper insight into the correct reaction and impact. Even then also it may be argued that investors' reaction may not be reliable one and may not be the correct indicator owing to the small representation of the public in stock market. Also the scale of the event makes it very complicated to study the reaction without having to worry about the cross-correlation. However we are trusting on the fact that the stock market participants, however miniscule they might be, are very informed and have great financial motivation to predict the impact. We further want to highlight here that this paper is by no means a commentary on the economic success of failure of the Government's decision to demonetise. These kinds of stock market studies which are minor attempts to

assess the impact of demonetisation may appear to be of not much relevance as of now, but may subsequently fall into place when a bigger picture is discussed after a substantial period of time.

References

1.   See Reserve Bank of India, Annual Report, March 31, 2016 (Part VIII – Currency Management), available at: https://www.rbi.org.in/scripts/AnnualReportPublications.aspx? Id=1181, and Price Waterhouse Coopers, "*Disrupting cash: Accelerating Electronic Payments in India*", available at: https://www.pwc.in/assets/pdfs/publications/2015/disrupting-cash-accelerating-electronic-payments-in-india.pdf.

2.   https://economictimes.indiatimes.com/slideshows/investmentsmarkets/"*HowDemonetisation-will-impact-top-11-sectorsofEconomy*"/slideshow/55432934.cms, November 15, 2016, 01.11 PM IST, retrieved on 26.10.2017 at 12.00 PM.

3.   http://dx.doi.org/10.1016/0304-405X (85)90042-X, Brown, S. and Warner, J. (1985), "*Using Daily Stock Returns: The Case of Event Studies*". Journal of Financial Economics, 14, 3-31.

4.   http://ssrn.com/abstract=2144002, Dhammika, Dharmapala & Vikramaditya S., Khanna, "*Stock Market Reactions to India's 2016 Demonetization: Implications for Tax Evasion, Corruption, and Financial Constraints*", The Social Science Research Network Electronic Paper Collection.

5.   Rajan, Raghuram G. and Luigi Zingales (1998), "*Financial Dependence and Growth*", American Economic Review 88: 559–586.

6.   See Modi address 2016 and Press Releases, Ministry of Finance, Department of Economic Affairs, New Delhi, November 8, 2016 and December 1, 2016. Some exceptions were made for emergencies (e.g., paying hospital bills).

7.   Kulkarni, Dhaval (2016) "Demonetization hits real estate hard", *DNA India*, December 2, 2016, available at: http://www.dnaindia.com/mumbai/report-demonetization-hits-real-estate-hard-2278879.