

Did Demonetization Affect Indian Stock Market?

Sohail Raza, Shahzad Munir

Wang Yanan Institute for Studies in Economics (WISE), Xiamen University, 422 South Siming Road, Xiamen, 361005, China

ARTICLE INFO

ABSTRACT

Keywords:
National Stock Exchange,
2016 Demonetization,
OLS,
Fixed Effect,
Random Effect.

Kata Kunci:
Bursa Efek Nasional,
Demonetisasi 2016,
OLS,
Efek Tetap,
Efek Acak.

This study explores the impact of "2016 demonetization" on the stock market in India. The policy declared 86% of cash in circulation in the form of Indian rupees (INR) 500 & 1000 notes as an illegal tender effective from midnight of November 8, 2016. However, India's government progressively released new 500 and 2000 INR notes over the next few months. Following the demonetization announcement, stock prices of cash-sensitive industries like consumer goods and financial services dropped rapidly, reflecting a significant reduction in demand. This study focuses on the short-term effects of demonetization on the stock prices of 100 publicly listed firms using their daily stock data. We use estimating windows within 60 days of the announcement and then capture the short-term effects of demonetization by employing the Ordinary Least Square (OLS), the Fixed Effect (FE), and the Random Effect (RE) methods. Estimation results demonstrate that demonetization effectively decreases stock prices.

Corresponding author:
raza.sohailalig@gmail.com

SARI PATI

Studi ini mengeksplorasi dampak "demonetisasi 2016" di pasar saham India. Kebijakan tersebut menyatakan 86% uang tunai yang beredar dalam bentuk uang kertas Rupee India (INR) 500 & 1000 sebagai tender ilegal yang berlaku mulai tengah malam tanggal 8 November 2016. Namun, pemerintah India secara bertahap merilis uang kertas baru 500 dan 2000 INR pada periode berikutnya selang beberapa bulan. Setelah pengumuman demonetisasi, harga saham industri yang sensitif terhadap uang tunai seperti barang konsumsi dan jasa keuangan turun dengan cepat, yang mencerminkan penurunan permintaan yang signifikan. Studi ini berfokus pada efek jangka pendek demonetisasi pada harga saham 100 perusahaan publik menggunakan data saham harian mereka. Kami menggunakan perkiraan jendela dalam waktu 60 hari setelah pengumuman dan kemudian menangkap efek jangka pendek dari demonetisasi dengan menggunakan metode Ordinary Least Square (OLS), Fixed Effect (FE), dan Random Effect (RE). Hasil estimasi menunjukkan bahwa demonetisasi efektif menurunkan harga saham.

Copyright © 2021 by Authors,
Published by IRJBS.
This is an open access article under
the CC BY-SA License



INTRODUCTION

On November 8, 2016, the government of India surprisingly announced demonetization. The policy declared 86% of cash in circulation in the form of Indian rupees (INR) 500 (\$7.5) & 1000 (\$15) notes as an illegal tender effective from midnight of November 8, 2016. However, the government of India gradually introduced new notes of INR 500 and 2000 (\$30) over the next several months. The main objectives of demonetization include controlling black money, removing fake notes and making the Indian economy cashless (Chodorow-Reich et al., 2019). The government also issued a deadline to exchange and surrender demonetize notes in any Indian bank by December 31, 2016¹. During this period, one can exchange old notes with new ones up to a certain daily limit imposed by the Reserve Bank of India (RBI)². Initially, the government did not print and distribute new notes to the banks to keep the policy secret. Therefore, the printing press faced a severe hurdle with printing and distributing new notes after the announcement. The observed immediate effects of demonetization include cash shortage, higher bank deposits and a significant drop in demand for goods and services.

RBI (2017) reported that 99% of the demonetized cash has arrived at the end of April 2018, which shows that the main objectives of the demonetization were not properly achieved. After the demonetization announcement, the RBI spent roughly \$130 billion to remonetize the Indian money market over the next few years. The overall cost of printing new and old notes³ surpassed the total value of the demonetized money, raising many questions about the aim of demonetization. Furthermore, India's cashless payment initiative did not improve

significantly after demonetization. According to a study conducted by Mukhopadhyay (2019), the rapid use of alternative payment channels was just temporary and returned to the normal stage after few months of demonetization. He also mentioned that the number of cash transactions increased by 38% at the end of March 2018.

According to the Economic Survey of India 2016-17, demonetization resulted in a 1% drop in economic production. The yearly rate of GDP growth fell from 8% in 2016 to 5% in 2019. Chodorow-Reich et al. (2019) pointed out that demonetization significantly reduces economic activity by two p.p. Most of the previous studies documented the adverse effect of demonetization on public sentiments and Indian economic indicators. Moreover, the impact of demonetization on the Indian stock market has been thoroughly discussed in the literature.

The shortage of cash reduced purchasing power and led to a decline in the performance of various sectors, especially cash-sensitive sectors like consumer goods, automobiles, etc. The demonetization reduced cash activities in the economy over the next few months, which subsequently reduced demand for various goods and services and caused a significant decline in the firms' stock prices.

The impact of the announcement of demonetization on the Indian stock market has been thoroughly studied in the literature. It is stated that the shortage of cash reduces purchasing power, prompting to significant decline in the performance of various economic sectors, especially cash-sensitive sectors like consumer goods, automobiles, etc. It is also

1 For Non-resident Indians, the deadline was June 30, 2017.

2 The exchange of old notes was initially restricted up to INR 4000 (\$60) per person per day, while restrictions on ATM withdrawals were INR 2000 (\$30) per day per card and cash withdrawals from the account were INR 10000 (\$150) per day person. These restrictions were relaxed progressively and finally removed on January 30, 2017. It is worth noted that demonetization restricted cash transactions while there were no restrictions on the usage of debit, credit cards, cheques or E-wallets for payments and transactions. Banerjee et al. (2018) pointed out the general confusion that evolved among the public regarding withdrawals and deposit of cash during demonetization was due to frequent changes of rules by the government.

3. old notes of smaller denominations.

pointed that the demonetization reduces cash activity in the economy over the next few months, which dropped demand for various goods and services. Thus, a significant fall in the firms' stock prices can be observed.

This paper is entirely motivated by previous research works conducted to analyze the impact of demonetization on Indian stock market performance. However, the estimation methodology employed in this paper is quite diverse from previous studies. Most of the documented literature of demonetization have followed "Event Studies" methodology. The common drawback of doing an event study is that it assumes that an event is unaffected by any other domestic or global economic shock. If that is the case, then the results of the event study might not be appealing. For instance, U.S. Presidential election was held on the same day of the demonetization announcement, or the global crude oil price jumped over 60% from January to October 2016. Such events might have affected the Indian stock market. Therefore, this paper uses three different estimation models, such as Ordinary Least Square (OLS), Fixed Effect (FE) and Random Effect (RE), to analyze the short-term impact of demonetization on stock prices using a panel of 100 publicly listed firms with important control variables.

The organization of the rest of the paper is as follows: Section 2 summarizes former literature and empirical research conducted to study the impact of demonetization. Section 3 presents the data sources and empirical methodology of the study. Section 4 contains empirical findings and discussions. Section 6 contains the concluding remarks and provides suggestions for further research.

LITERATURE REVIEW

The impact of demonetization on different economic sectors in India is studied by RBI (2017),

that indicates a substantial fall in the performance of different sectors in India. Aggarwal and Narayanan (2017) studied the impact of demonetization on the agriculture commodities prices. They observed a sharp decline in agriculture commodities prices by nearly 15% in the short-term and displaced domestic agricultural trade by 7%, after 90 days of demonetization announcement. Mukhopadhyay (2019) observed the impact of demonetization on consumer sentiments using consumer confidence survey data of 6 major cities of India viz. Hyderabad, Kolkata, Chennai, Bangalore, and Mumbai. The study found a negative impact of demonetization on consumer sentiments due to restricted economic activities and loss of faith on government. Mukhopadhyay (2019) also argued that the demonetization has increased uncertainty about the future, which led to a net pessimistic outlook among consumers. Krishnan and Siegel (2017) conducted an income survey in the slums of Mumbai and found that demonetization significantly reduced the income level of respondents. However, the overall view about demonetization was quite positive among respondents, signalling the act of demonetization as purely aiming for political gain. Banerjee and Kala (2017) presented a study on demonetization in domestic wholesale market of Uttar Pradesh domestic India⁴ and reported a 100% decline in the sale which caused to reduce Bhartiya Janta Party (BJP)⁵ vote by about 0.00045 p.p.

Moreover, Chodorow-Reich et al. (2019) studied the effects of demonetization on economic activities by using a very unique and diverse data set for causal inference such as nightlights and employment survey data to measure economic activities around demonetization, geographical locations of new and old notes for measuring the intensity of demonetization shock, E-wallets and ATM transactions to assess the cash activities. The study revealed that the demonetization significantly reduced cash transactions with faster adoption

4 Uttar Pradesh is the largest populated state of India with the highest number of voters, and the election was taken place right after demonetization.

5 Bhartiya Janta Party was the ruling party at centre and strong opposition party at Uttar Pradesh State election of 2017.

of alternative payment technologies (E-wallets). Economic activities were significantly reduced by two p.p. during demonetization due to cash shortage. Agrawal (2018) presented a trade-off model faced by consumers with regards to holding black money and evading taxes on one side, and getting a heavy penalty if caught by auditors on the other hand. She closely explained the rise of money laundering due to a policy like demonetization where the government forces agents to reveal their actual taxable incomes.

Several studies have been conducted to analyze the impact of demonetization on the stock prices. For instance, Agrawal and Sangeetha (2019) studied the impact of demonetization on the Indian stock market using five major Indian stock indices returns and found that market returns were sharply declined during the post-demonetization period due to negative sentiments of the investors. On the other hand, the study showed that sectors like pharmaceuticals remained unaffected during demonetization as the government allows people to buy medicines with old notes till December 15, 2016. Iyengar et al. (2017) conducted an event study to infer the impact of demonetization on cash-sensitive sectors like consumer goods, Fastest Moving Consumer's Goods, banking and automobiles using a time window of 30-days before and after demonetization announcement. The estimation results showed a significant negative effect of demonetization due to restriction on cash transactions, which affects the price movements of these sectors. Divya and Sophia (2017) used the stock prices data of top 10 software companies in India to analyze the impact of demonetization on stock prices and consumer sentiments using event study by employing the GARCH model. Their study found the negative effect of demonetization on the stock returns of these companies. A study conducted by Upadhyay and Suvarna (2018) reported that the stock prices listed in the Bombay Stock Exchange (BSE) had not been affected by the demonetization announcement.

Furthermore, Sharma (2019) performed event study using 50 firms listed in National Stock Exchange (NSE) and reported no significant impact of demonetization. Similarly, Kumar and Bhatia (2018) analyzed the impact of demonetization on different stocks listed in National Stock Exchange (NSE) and Bombay Stock Exchange (BSE). The empirical findings concluded with the mixed results of negative and positive impacts on these stocks prices.

The main drawback of using an event study is that, it assumes other events do not affect the event window, which is not appropriate to assume. For instance, some global shocks observed during the demonetization period, like U.S. presidential election or the global crude oil prices jumped over 60% from January 2016 to October 2016 will have some degree of impact on Indian stock market. Therefore, while making causal inferences, researchers might think of using a different methodology to control such events. Thus, this study utilizes three different estimation models, such as Ordinary Least Square (OLS), Fixed Effect (FE) and Random Effect (RE), to analyze the short-term impact of demonetization on stock prices using a panel of 100 publicly listed firms with important control variables.

METHODS

Data Sources

This study uses daily data from November 8, 2014 to November 8, 2018, of financial variables including stock prices, ROE, Debt-Equity ratio, Asset Turnover, Revenue and Tax of 100 publicly listed Indian firms. The variable Return on Equity (ROE) ratio is defined as the rate of return of the common stocks owned by the individuals. The variable Debt equity ratio measures the firm's proportion of debt and equity that is used to finance its asset. Asset turnover indicates firm's efficiency by calculating the ratio of total revenue to its relative value of assets. Revenue is simply measuring firm's revenue and at last, Tax indicates the total taxes paid by a firm during a financial year. The variables are obtained from

Compustat using Wharton Research Data Services. Additionally, the Global Industry Classification Standard codes are obtained from Compustat to match the firms with their respective sectors and to create sub-samples. Moreover, we define five windows of period 7-days, 14-days, 21-days, 30-days and 60-days after demonetization to capture the average effect of demonetization on stock prices. Table 1 presents the summary statistics of the target and features used in this paper.

Empirical Methodology

It is generally observed that macro-economic shocks bring some degree of spillover effects into different economic sectors, affecting the economic outcome. On November 8, 2016, the announcement of demonetization has created confusion among the public. It has imposed restrictions on cash transactions for several months, resulting in a sharp decline in demand for consumer goods and services, affecting the stock prices of several cash-sensitive firms. However, this paper focuses on the short-term impact of demonetization on stock prices of publicly listed Indian firms by employing Ordinary Least Square (OLS), Fixed Effect (FE), and Random Effect (RE) to test the following hypothesis, H_1 : Demonetization significantly affects the Stock prices of the firms.

Ordinary Least Square

We define the following Ordinary Least Square (OLS) equation to capture the impact of demonetization on stock prices.

$$Y_{it} = \beta_0 + \sum_{j=1}^5 \beta_j \text{Dummy}_{it} + \beta_n X'_{it} + \varepsilon_{it} \dots\dots\dots (1)$$

where, Y_{it} presents the stock prices of firm i at time t , while Dummy_{it} is a dummy variable for firm i at time t . $\sum_{j=1}^5 \text{Dummy}_{it}$ indicates 5 windows for the dummy variables. These windows present the five different time periods such as 7-days, 14-days, 21-days, 30-days, and 60-days after demonetization announcement. Thus, each dummy variable takes value 1 if it belongs to a period of given window and 0 otherwise. X'_{it} is a vector of control variables containing firm-specific control variables namely, ROE, Debt-Equity ratio, Asset Turnover, Revenue and Tax of firm i at time t . Finally, $\beta_j, \{j = 1, \dots, 5\}$, is the coefficient of interest which captures the average effect of demonetization on stock prices. ε_{it} represents innovation term.

Fixed Effect

One of the advantages of using panel data is its ability to control unobserved fixed effects. Given the demonetization design, the fixed effect approach, in this case, allows to control time fixed effect,

Table 1. Summary Statistics for Full Sample

Variables	N	Mean	SD	Min	Max	Skewness	Kurtosis
Stock prices	108435	555.86	1049.50	0.05	9832.45	3.44	18.84
7-days	108435	0.01	0.08	0.00	1.00	11.91	142.78
14-days	108435	0.01	0.12	0.00	1.00	8.33	70.40
21-days	108435	0.02	0.14	0.00	1.00	6.73	46.28
30-days	108435	0.03	0.17	0.00	1.00	5.55	31.81
60-days	108435	0.06	0.24	0.00	1.00	3.74	14.95
ROE	99622	6.92	37.66	0.00	608.67	12.47	182.31
Debt-Equity	79363	172.89	771.56	-13.64	6451.45	6.05	40.99
Asset-Turn	97504	11.16	95.83	0	1603.67	14.59	226.04
Revenue	100144	107900.1	221539	0	1151717	2.97	11.18
Tax	100144	2567.25	5345.15	785.35	35172	3.17	13.55

Notes: This table is based on Author's calculations. This table contains the summary statistics of the target and features used in this study. N presents the number of observations.

i.e., day, week, and month fixed effect. Therefore, we defined the following equation to capture the impact of demonetization on stock prices using the Fixed Effect approach.

$$Y_{it} = \beta_0 + \sum_{j=1}^5 \beta_j \text{Dummy}_{it} + \beta_n X'_{it} + \delta_{it} + \nu_{it} \dots \quad (2)$$

where, Y_{it} presents the stock prices of firm i at time t , while is a dummy variable for firm i at time t . $\sum_{j=1}^5 \beta_j \text{Dummy}_{it}$ indicates 5 windows for the dummy variables. These windows present the five different time periods such as 7-days, 14-days, 21-days, 30-days, and 60-days after demonetization announcement. Thus, each dummy variable takes value 1 if it belongs to a period of given window and 0 otherwise. X'_{it} is a vector of control variables containing firm-specific control variables namely, ROE, Debt-Equity ratio, Asset Turnover, Revenue and Tax of firm i at time t . Finally, $\beta_j, \{j = 1, \dots, 5\}$, is the coefficient of interest which captures the average effect of demonetization on stock prices. Finally, δ_{it} presents time-specific fixed effect, i.e., day, week, and month fixed effect. ν_{it} represents innovation term.

Random Effect

It is well known that a fixed effect model can control for unobserved fixed-effect factors and reduces the possibility of omitted variable bias by omitting the time-invariant factor from the model. However, in the case of potential serial correlation, the random effect model is more appealing. This is because the random effect model assumes that the unobserved variable is uncorrelated with all explanatory variables at all time periods resulting in more accurate & efficient estimators (Wooldridge, 2016). Therefore, we define the following equation to estimate the impact of demonetization using the Random Effect approach.

$$Y_{it} = \beta_0 + \sum_{j=1}^5 \beta_j \text{Dummy}_{it} + \beta_n X'_{it} + \mu_{it} \dots \dots \dots \quad (3)$$

where, Y_{it} presents the stock prices of firm i at time t , while is a dummy variable for firm i at time t . $\sum_{j=1}^5 \beta_j \text{Dummy}_{it}$ indicates 5 windows for the

dummy variables. These windows present the five different time periods such as 7-days, 14-days, 21-days, 30-days, and 60-days after demonetization announcement. Thus, each dummy variable takes value 1 if it belongs to a period of given window and 0 otherwise. X'_{it} is a vector of control variables containing firm-specific control variables namely, ROE, Debt-Equity ratio, Asset Turnover, Revenue and Tax of firm i at time t . Finally, $\beta_j, \{j = 1, \dots, 5\}$, is the coefficient of interest which captures the average effect of demonetization on stock prices. Additionally, $\mu_{it} = \delta_i + \nu_{it}$ and μ_{it} are serially correlated across time (which is driven by the time invariant factor).

RESULTS AND DISCUSSION

Now we will look at the evidence that demonetization affected the stock prices of 100 publicly traded Indian firms.

Full Sample Results

Table 2 contains the Ordinary Least Square estimates of the effect of demonetization on the stock prices of publicly listed firms. Column (1) to Column (6) present estimation results for dummy variable 7-days, 14-days, 21-days, 30-days, and 60-days, respectively, using equation (1). The coefficient for 7-days is found statistically insignificant, while the coefficients for the remaining dummy variables are found negative significant. As a result, we can conclude that demonetization reduced the stock prices of publicly listed firms significantly. The estimated coefficient for 60-days is 67, implying that within 60 days of demonetization, the stock prices of 100 publicly listed Indian firms fell by an average of INR 67. The stock prices of publicly listed firms fell sharply as the window size expanded, especially from 14 to 60 days, as seen in Table 2.

Table 3 contains fixed effect estimates of the effect of demonetization on the stock prices of 100 publicly listed Indian firms. The estimated coefficients of five regression models using dummies, namely 7-days, 14-days, 21-days, 30-days, and 60-days, are presented in Columns (1) to (5), respectively, using

equation (2). The coefficients of dummy variables are statistically significant with negative signs, implying that demonetization significantly reduced the stock prices of publicly listed firms in the short-term. On average, the firm's stock prices reduced from INR 58 to INR 70 within 7-days to 60-days.

Random effect estimates of the effect of demonetization on 100 publicly listed Indian firms are given in Table 4. Column (1) to Column (5) contain the estimated coefficients of five regression models using dummies, namely 7-days, 14-days, 21-days, 30-days, and Post 60-days, respectively, using equation (3). From Table 4, it is observed that, on average, the stock prices of publicly listed

firms significantly declined by INR 50 to INR 70 after demonetization. Moreover, the random effect approach results are consistent with the Ordinary Least Square and Fixed effect approach findings.

Estimation across Sectors

Moreover, we divide firms according to their nature of business using Global Industry Classification Standard codes to capture the impact of demonetization across the sectors In Table 5 it is observed that demonetization has a large negative significant effect on the economic and financial sector, signalling that restrictions on cash transactions reduce the demand for the products. Tables 5, 6, and 7 present ordinary least square, fixed

Table 2. Ordinary Least Square Estimation for all Sectors using Full Sample

Variable	Stock Price				
	(1)	(2)	(3)	(4)	(5)
7-days	-51.7768 (33.3252)				
14-days		-62.4850*** (23.2063)			
21-days			-61.3458*** (19.1501)		
30-days				-61.6025*** (16.1524)	
60-days					-67.8463*** (11.3508)
ROE	-12.4349*** (0.5508)	-12.4416*** (0.5509)	-12.4469*** (0.5511)	-12.4542*** (0.5512)	-12.4848*** (0.5519)
Debt-Equity Ratio	0.2469*** (0.0102)	0.2469*** (0.0101)	0.2469*** (0.0101)	0.2469*** (0.0101)	0.2473*** (0.0101)
Asset Turnover	-0.2813*** (0.0051)	-0.2804*** (0.0052)	-0.2797*** (0.0052)	-0.2787*** (0.0052)	-0.2785*** (0.0052)
Revenue	-0.0005*** (0.0000)	-0.0005*** (0.0000)	-0.0005*** (0.0000)	-0.0005*** (0.0000)	-0.0005*** (0.0000)
Tax	0.0630*** (0.0020)	0.0630*** (0.0020)	0.0630*** (0.0020)	0.0630*** (0.0020)	0.0630*** (0.0020)
Constant	363.9399*** (3.3754)	364.4648*** (3.3826)	364.8883*** (3.3903)	365.4618*** (3.4006)	367.6325*** (3.4276)
Observations	78,005	78,005	78,005	78,005	78,005
R-squared	0.1343	0.1344	0.1344	0.1345	0.1346

Notes: This table captures the impact of demonetization on stock prices Indian firms by employing Ordinary Least Square. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3. Ordinary Least Square Estimation for all Sectors using Full Sample

Variables	Stock Prices				
	(1)	(2)	(3)	(4)	(5)
7-days	-58.4791** (24.7395)				
14-days		-77.2017*** (28.8424)			
21 days			-73.0972** (28.1607)		
30-days				-72.7005** (28.6610)	
60-days					-70.9415** (27.8700)
ROE	-3.3358 (3.3494)	-3.3533 (3.3493)	-3.3660 (3.3496)	-3.3843 (3.3501)	-3.4464 (3.3592)
Debt-Equity Ratio	0.1179 (0.0885)	0.1179 (0.0884)	0.1178 (0.0883)	0.1178 (0.0882)	0.1187 (0.0884)
Asset Turnover	0.0039 (0.0061)	0.0058 (0.0063)	0.0073 (0.0065)	0.0093 (0.0068)	0.0109 (0.0066)
Revenue	0.0002 (0.0014)	0.0002 (0.0014)	0.0002 (0.0014)	0.0002 (0.0014)	0.0002 (0.0014)
Tax	0.0463 (0.0544)	0.0464 (0.0544)	0.0465 (0.0544)	0.0467 (0.0544)	0.0465 (0.0544)
Constant	307.5430 (189.5059)	307.7493 (189.6616)	307.5758 (189.7727)	307.6034 (189.9260)	324.4486* (191.1601)
Observations	78,005	78,005	78,005	78,005	78,005
R-squared	0.0731	0.0734	0.0735	0.0738	0.0743
No. of Firms	100	100	100	100	100
Day Effect	YES	YES	YES	YES	YES
Month Effect	YES	YES	YES	YES	YES

Notes: This table captures the impact of demonetization on stock prices Indian firms by employing the Fixed Effect model. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3. Fixed Effect Estimation for all Sectors using Full Sample

Variables	Stock Prices				
	(1)	(2)	(3)	(4)	(5)
7-days	-58.4854** (24.7323)				
14-days		-77.2083*** (28.8341)			
21 days			-73.1040*** (28.1539)		
30-days				-72.7074** (28.6553)	
60-days					-70.9441** (27.8738)
ROE	-3.3470 (3.3359)	-3.3646 (3.3358)	-3.3772 (3.3362)	-3.3955 (3.3367)	-3.4574 (3.3457)

Debt-Equity Ratio	0.1180 (0.0885)	0.1179 (0.0884)	0.1179 (0.0883)	0.1179 (0.0882)	0.1187 (0.0883)
Asset Turnover	0.0036 (0.0061)	0.0055 (0.0063)	0.0070 (0.0065)	0.0091 (0.0068)	0.0106 (0.0066)
Revenue	0.0002 (0.0013)	0.0002 (0.0014)	0.0002 (0.0014)	0.0002 (0.0014)	0.0002 (0.0014)
Tax	0.0463 (0.0543)	0.0464 (0.0543)	0.0465 (0.0544)	0.0467 (0.0544)	0.0465 (0.0543)
Constant	356.3879*** (125.5397)	356.5084*** (125.6463)	356.2715*** (125.6773)	356.2071*** (125.7565)	373.0443*** (129.3517)
Observations	78,005	78,005	78,005	78,005	78,005
No. of Firms	100	100	100	100	100
Day Effect	YES	YES	YES	YES	YES
Month Effect	YES	YES	YES	YES	YES

Notes: This table captures the impact of demonetization on stock prices Indian firms by employing the Random Effect model. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Random Effect Estimation for all Sectors using Full Sample

Variables	Stock Prices				
	(1)	(2)	(3)	(4)	(5)
7-days	-58.4854** (24.7323)				
14-days		-77.2083*** (28.8341)			
21-days			-73.1040*** (28.1539)		
30-days				-72.7074** (28.6553)	
60-days					-70.9441** (27.8738)
ROE	-3.3470 (3.3359)	-3.3646 (3.3358)	-3.3772 (3.3362)	-3.3955 (3.3367)	-3.4574 (3.3457)
Debt-Equity Ratio	0.1180 (0.0885)	0.1179 (0.0884)	0.1179 (0.0883)	0.1179 (0.0882)	0.1187 (0.0883)
Asset Turnover	0.0036 (0.0061)	0.0055 (0.0063)	0.0070 (0.0065)	0.0091 (0.0068)	0.0106 (0.0066)
Revenue	0.0002 (0.0013)	0.0002 (0.0014)	0.0002 (0.0014)	0.0002 (0.0014)	0.0002 (0.0014)
Tax	0.0463 (0.0543)	0.0464 (0.0543)	0.0465 (0.0544)	0.0467 (0.0544)	0.0465 (0.0543)
Constant	356.3879*** (125.5397)	356.5084*** (125.6463)	356.2715*** (125.6773)	356.2071*** (125.7565)	373.0443*** (129.3517)
Observations	78,005	78,005	78,005	78,005	78,005
No. of Firms	100	100	100	100	100
Day Effect	YES	YES	YES	YES	YES
Month Effect	YES	YES	YES	YES	YES

Notes: This table captures the impact of demonetization on stock prices Indian firms by employing the Random Effect model. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

effect, and random effect estimates, respectively, of the effect of demonetization on the Economic and Financial sectors. Column (1) to Column (5) of each table contain the estimated coefficients of five regression models using dummies, namely 7-days, 14-days, 21-days, 30-days, and 60-days, respectively, using equations defined in Section 3. Overall, it is observed that demonetization significantly declined the stock prices of Economic and Financial sectors. Therefore, the demonetization announcement largely affected those firms which are more sensitive to cash. It is also observed that within one month of demonetization, the stock prices are more affected than within 60-days.

Tables 8, 9, and 10 contain ordinary least square, fixed effect, and random effect estimates, respectively, of the effect of demonetization on the other sectors; that includes firms dealing in information technology, telecommunication services, utilities and energy. Column (1) to Column (5) of each table present the estimated coefficients of five regression models using dummies, namely 7-days, 14-days, 21-days, 30-days, and 60-days, respectively, using equations defined in Section 3. Similar to the Economic and Financial sectors, it is observed that demonetization has a negative spillover effect on other sectors.

Table 5. Ordinary Least Square Estimation for Economic and Financial Sectors using Sub Sample

Variables	Stock Prices				
	(1)	(2)	(3)	(4)	(5)
7-days	-84.8896** (37.0353)				
14-days		-93.8187*** (25.9482)			
21-days			-92.4216*** (21.3815)		
30-days				-93.3019*** (17.9961)	
60-days					-75.8458*** (12.6097)
ROE	-4.5552*** (0.5992)	-4.5625*** (0.5988)	-4.5689*** (0.5985)	-4.5776*** (0.5981)	-4.5875*** (0.5992)
Debt-Equity Ratio	0.3131*** (0.0097)	0.3132*** (0.0097)	0.3132*** (0.0097)	0.3133*** (0.0097)	0.3137*** (0.0097)
Asset Turnover	-0.2442*** (0.0029)	-0.2429*** (0.0030)	-0.2418*** (0.0031)	-0.2403*** (0.0032)	-0.2413*** (0.0030)
Revenue	-0.0001*** (0.0000)	-0.0001*** (0.0000)	-0.0001*** (0.0000)	-0.0001*** (0.0000)	-0.0001*** (0.0000)
Tax	0.0377*** (0.0013)	0.0377*** (0.0013)	0.0378*** (0.0013)	0.0378*** (0.0013)	0.0377*** (0.0013)
Constant	361.7720*** (3.2660)	362.4665*** (3.2808)	363.0724*** (3.2953)	363.9011*** (3.3147)	365.6425*** (3.3830)
Observations	48,697	48,697	48,697	48,697	48,697
R-squared	0.0917	0.0918	0.0919	0.0920	0.0921

Notes: This table captures the impact of demonetization on Economic and Financial Sectors by employing Ordinary Least Square using sub sample. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

Table 6. Fixed Effect Estimation for Economic and Financial Sectors using Sub Sample

Variables	Stock Prices				
	(1)	(2)	(3)	(4)	(5)
7-days	-50.9985** (19.5067)				
14-days		-66.4540*** (22.5025)			
21 days			-61.0172*** (22.2393)		
30-days				-59.9400** (22.7801)	
60-days					-71.2952** (33.4164)
ROE	158.5893 (124.3426)	158.4860 (124.3260)	158.4498 (124.3267)	158.4040 (124.3283)	159.4463 (124.6402)
Debt-Equity Ratio	0.0125 (0.0587)	0.0126 (0.0586)	0.0127 (0.0585)	0.0128 (0.0584)	0.0135 (0.0584)
Asset Turnover	0.0010 (0.0032)	0.0026 (0.0030)	0.0036 (0.0029)	0.0052* (0.0028)	0.0079** (0.0032)
Revenue	0.0011 (0.0010)	0.0011 (0.0010)	0.0011 (0.0010)	0.0011 (0.0010)	0.0011 (0.0010)
Tax	-0.0340 (0.0214)	-0.0339 (0.0214)	-0.0339 (0.0214)	-0.0338 (0.0214)	-0.0338 (0.0213)
Constant	80.6055 (309.9905)	80.7632 (310.0678)	80.5371 (310.1005)	80.4253 (310.1619)	95.8787 (312.1308)
Observations	48,697	48,697	48,697	48,697	48,697
R-squared	0.0278	0.0280	0.0281	0.0282	0.0291
No. of Firms	63	63	63	63	63
Day Effect	YES	YES	YES	YES	YES
Month Effect	YES	YES	YES	YES	YES

Notes: This table captures the impact of demonetization on Economic and Financial Sectors by employing the Fixed Effect model using sub sample. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

Discussion

The article examines the effect of demonetization announcement on the Indian stock market. To do that, this study uses the stock prices of 100 firms, listed in the National Stock Exchange (NSE). Similar to Agrawal and Sangeetha (2019), who have found that the Indian stock indices are sharply declined after the demonetization announcement, this study also finds the negative effect of demonetization announcement on Indian stock market. Iyengar et al. (2017) also conclude his study by showing that the most of the cash-sensitive sectors like consumer goods, etc. are adversely affected by demonetization due to their high dependency on cash. The sudden restriction on cash volume is one of the vital factors of this negative affect. This study also uses the sample of firms, which are

cash-sensitive (Economic and financial sectors firms) and finds the negative spillover effect of demonetization. Overall, this study is very consistent with the previous literature and finds the similar pattern of demonetization effect. However, this study will provide a new range of estimation techniques and robust calculations that fills the past research gap significantly

MANAGERIAL IMPLICATIONS

The sample firms used in this study represent wide range of economic and financial sectors which are highly rely on the cash. These firms are listed in the National Stock Market (NSE) and their stocks are frequently traded by the retail investors in India. This study shows that if any kind of macro-economic shock that restricts the cash activities may affect the

Table 7. Random Effect Estimation for Economic and Financial Sectors using Sub Sample

Variables	Stock Prices				
	(1)	(2)	(3)	(4)	(5)
7-days	-52.8254*** (19.5812)				
14-days		-68.4771*** (22.6683)			
21 days			-62.7113*** (22.2483)		
30-days				-61.3667*** (22.7107)	
60-days					-68.2509** (32.5217)
ROE	49.0995 (49.6290)	49.0613 (49.6166)	49.0432 (49.6149)	49.0190 (49.6139)	49.3488 (49.8309)
Debt-Equity Ratio	0.0240 (0.0648)	0.0241 (0.0646)	0.0242 (0.0646)	0.0243 (0.0644)	0.0250 (0.0645)
Asset Turnover	-0.0018 (0.0032)	-0.0001 (0.0029)	0.0009 (0.0027)	0.0025 (0.0026)	0.0047* (0.0027)
Revenue	0.0010 (0.0011)	0.0010 (0.0011)	0.0010 (0.0011)	0.0010 (0.0011)	0.0010 (0.0011)
Tax	-0.0321 (0.0237)	-0.0320 (0.0237)	-0.0319 (0.0237)	-0.0318 (0.0237)	-0.0319 (0.0236)
Constant	160.5939 (218.8262)	160.6228 (218.9245)	160.3236 (218.9341)	160.1112 (218.9753)	174.8901 (222.5622)
Observations	48,697	48,697	48,697	48,697	48,697
No. of Firms	63	63	63	63	63
Day Effect	YES	YES	YES	YES	YES
Month Effect	YES	YES	YES	YES	YES

Notes: This table captures the impact of demonetization on Economic and Financial Sectors by employing the Random Effect model using sub sample. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8. Ordinary Least Square Estimation for Other Sectors using Sub Sample

Variables	Stock Prices				
	(1)	(2)	(3)	(4)	(5)
7-days	-55.2770 (48.6879)				
14-days		-69.3442** (33.5211)			
21-days			-69.0829** (27.7027)		
30-days				-68.9187*** (23.3853)	
60-days					-53.3050*** (16.6830)
ROE	-4.1752*** (0.3325)	-4.1818*** (0.3326)	-4.1872*** (0.3328)	-4.1942*** (0.3330)	-4.2176*** (0.3337)
Debt-Equity Ratio	0.0435*** (0.0061)	0.0434*** (0.0061)	0.0434*** (0.0061)	0.0433*** (0.0061)	0.0438*** (0.0061)

Asset Turnover	-5.6078*** (0.1369)	-5.6054*** (0.1366)	-5.6034*** (0.1363)	-5.6009*** (0.1360)	-5.6110*** (0.1361)
Revenue	-0.0088*** (0.0002)	-0.0088*** (0.0002)	-0.0088*** (0.0002)	-0.0088*** (0.0002)	-0.0088*** (0.0002)
Tax	0.3614*** (0.0075)	0.3614*** (0.0075)	0.3615*** (0.0075)	0.3615*** (0.0075)	0.3613*** (0.0075)
Constant	431.5115*** (4.9047)	432.1487*** (4.9246)	432.6724*** (4.9447)	433.3456*** (4.9714)	434.3468*** (5.0330)
Observations	29,308	29,308	29,308	29,308	29,308
R-squared	0.3806	0.3807	0.3807	0.3807	0.3808

Notes: This table captures the impact of demonetization on Other Sectors by employing Ordinary Least Square using sub sample. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9. Fixed Effect Estimation for Other Sectors using Sub Sample

Variables	Stock Prices				
	(1)	(2)	(3)	(4)	(5)
7-days	-74.3170** (33.3780)				
14-days		-99.1053** (40.7620)			
21 days			-99.1191** (39.9776)		
30-days				-102.0101** (41.1616)	
60-days					-80.4696** (33.4883)
ROE	-4.5513 (4.2912)	-4.5668 (4.2893)	-4.5803 (4.2872)	-4.5998 (4.2842)	-4.6718 (4.2940)
Debt-Equity Ratio	0.1342 (0.1188)	0.1339 (0.1186)	0.1337 (0.1184)	0.1334 (0.1182)	0.1347 (0.1184)
Asset Turnover	1.6588 (1.7321)	1.6975 (1.7379)	1.7327 (1.7429)	1.7843 (1.7507)	1.7781 (1.7454)
Revenue	-0.0032*** (0.0010)	-0.0032*** (0.0010)	-0.0032*** (0.0010)	-0.0033*** (0.0010)	-0.0032*** (0.0010)
Tax	0.1594*** (0.0457)	0.1599*** (0.0456)	0.1603*** (0.0456)	0.1609*** (0.0455)	0.1600*** (0.0458)
Constant	344.7558 (254.2726)	346.1638 (253.9991)	346.9153 (253.8560)	348.3659 (253.6474)	363.6794 (251.0025)
Observations	29,308	29,308	29,308	29,308	29,308
R-squared	0.3378	0.3381	0.3384	0.3388	0.3390
No. of Firms	37	37	37	37	37
Day Effect	YES	YES	YES	YES	YES
Month Effect	YES	YES	YES	YES	YES

Notes: This table captures the impact of demonetization on Other Sectors by employing the Fixed Effect model using sub sample. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 10. Random Effect Estimation for Other Sectors using Sub Sample

Variables	Stock Prices				
	(1)	(2)	(3)	(4)	(5)
7-days	-74.1958** (33.3074)				
14-days		-98.9690** (40.6827)			
21-days			-98.9811** (39.8981)		
30-days				-101.8657** (41.0792)	
60-days					-80.4201** (33.4711)
ROE	-4.5512 (4.2901)	-4.5667 (4.2881)	-4.5801 (4.2860)	-4.5996 (4.2830)	-4.6716 (4.2928)
Debt-Equity Ratio	0.1341 (0.1188)	0.1338 (0.1185)	0.1336 (0.1184)	0.1333 (0.1181)	0.1346 (0.1183)
Asset Turnover	1.6303 (1.7164)	1.6688 (1.7221)	1.7038 (1.7271)	1.7551 (1.7349)	1.7491 (1.7298)
Revenue	-0.0032*** (0.0010)	-0.0032*** (0.0010)	-0.0032*** (0.0010)	-0.0032*** (0.0010)	-0.0032*** (0.0010)
Tax	0.1592*** (0.0456)	0.1597*** (0.0456)	0.1602*** (0.0455)	0.1608*** (0.0454)	0.1598*** (0.0457)
Constant	389.7588*** (139.0009)	390.4278*** (139.3057)	390.5547*** (139.4776)	391.1089*** (139.8151)	407.5789*** (142.9269)
Observations	29,308	29,308	29,308	29,308	29,308
No. of Firms	37	37	37	37	37
Day Effect	YES	YES	YES	YES	YES
Month Effect	YES	YES	YES	YES	YES

Notes: This table captures the impact of demonetization on Other Sectors by employing the Random Effect model using sub sample. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

stock prices of these firms negatively. Therefore, this paper provides a significant implication to the retail investors by showing that effect of demonetization on these firm's stock prices. This will help investors to rebalance their portfolio if any similar future event happens.

CONCLUSION

This study observed the short-term impact of demonetization on stock prices of 100 publicly listed Indian firms using Ordinary Least Square, Fixed Effect, and Random effect estimation techniques. On November 8, 2016, demonetization was announced by the government of India to control black money, remove fake notes, and make the Indian economy cashless. The empirical results of

all three models have shown a significant negative impact of demonetization on the Indian stock market. It has been observed that demonetization restricted cash transactions and spending, which sharply declined the demand for goods and services. Cash-sensitive sectors have been more affected by demonetization. The possible causal effect runs from imposed restrictions on cash transactions to reduction in the demand for various goods and services and therefore affects stock prices of the firms. The estimated results of other sectors have explained very much about the causal effect as that sector includes firms with more sensitivity to cash. It is observed that the magnitude of the effect is quite large, indicating that restriction on cash activity significantly reduces demand for

the goods and services of other sectors and, therefore, effects can be seen on their stock prices. However, this study focused on the short-term impact of demonetization. It concludes that within the employed window length of estimation, the stock prices of given sample firms are significantly

affected due to a sudden decline in cash activity over several months after the demonetization announcement. Furthermore, the current study can be extended by incorporating more firms into the sample and creating sub samples of more firms regarding their nature of business. ■

Acknowledgement

We are grateful to prominent research scholar Dr Masum A Patwary, School of Science and Engineering, Teesside University, United Kingdom for his great inspiration, and Md. Nekmahmud, Department of Marketing, Begum Rokeya University, Rangpur, Bangladesh for his kind co-operations.

REFERENCES

- Aggarwal, N. and Narayanan, S. (2017) 'Impact of india's demonetization on domestic agricultural markets', (March 1, 2021). Available at SSRN: <https://ssrn.com/abstract=3066042> or <http://dx.doi.org/10.2139/ssrn.3066042>
- Agrawal, P. and Sangeetha, R. (2019). 'Impact of demonetisation on indian stock market', *RESEARCH REVIEW International Journal of Multidisciplinary*.
- Agarwal, S. (2018). 'Black Economy and Demonetisation', *New York University*.
- Banerjee, A. and Kala, N. (2017). 'The economic and political consequences of india's demonetisation', *VoxDev*. URL:<http://voxddev.org/topic/institutions-political-economy/economic-and-politicalconsequences-india-s-demonetisation>
- Banerjee, A. V., Breza, E., Chandrasekhar, A. G. and Golub, B. (2018). 'When less is more: Experimental evidence on information delivery during india's demonetization', *NBER Working Paper No. 24679*.
- Chodorow-Reich, G., Gopinath, G., Mishra, P. and Narayanan, A. (2019). 'Cash and the economy: Evidence from india's demonetization', *The Quarterly Journal of Economics*, Vol. 135, No. 1, pp.57-103.
- Divya, V. and Sophia, S. (2017). 'Impact of demonetization on stock market return', *Amity Journal of Finance, India*. ISSN: 2456-1568 (Online).
- Iyengar, M.H., Iyengar, N. and Sampat, H. (2017). 'Impact of us election results on indian stock market: An event study approach', *International Journal of Applied Research*, Vol. 3, No. 5, pp.9-13.
- Krishnan, D. and Siegel, S. (2017) 'Effects of Demonetization: Evidence from 28 Slum Neighborhoods in Mumbai', (January 7, 2017). Available at SSRN: <https://ssrn.com/abstract=2896026> or <http://dx.doi.org/10.2139/ssrn.2896026>
- Kumar, V. and Bhatia, B. (2018) 'The effect of demonetization in indian stock market with special reference to sectorial indices: An event study', (September 7, 2018). Available at SSRN: <https://ssrn.com/abstract=3245889> or <http://dx.doi.org/10.2139/ssrn.3245889>
- Mukhopadhyay, B. (2019). 'Consumer confidence and lasting effect of demonetisation', *Review of Market Integration*, Vol. 11, No. 1-2, pp.54-92.
- RBI. (2017). 'Reserve Bank of India Annual Report', *Office of the Governor of RBI*.
- Sharma, D. (2019). 'Impact of demonetization on the share prices of companies listed in national stock exchange', *Paradigm*, pp.46.
- Upadhyay, D. and Suvarna, S. W. (2018). 'Impact of demonetization on the indian stock market: With special reference to bombay stock exchange', *Paradigm*, Vol. 22, No. 2, pp.175-184.
- Wooldridge, J.M., (2016). 'Introductory econometrics: A modern approach', *Nelson Education*.