

# Examining the Long-Term Effects of Demonetization on Digital Adoption In India

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## Abstract

The digital transformation has significantly contributed to the world by creating employment opportunities, minimizing carbon emissions, and building sustainable world. In India, the 'Digital India' drive and 'Demonetisation' have catalysed the digital revolution in the country. India became the second fastest growing digital economy across the world due to growing internet penetration, robust IT sector, rising smartphone, and demographic dividend. Although, demonetisation has given a big thrust to digital adoption in the country. The present study attempts to explore and examine the demand-side effects of demonetisation on digital adoption in the long run by using paired sample t-test. The findings reveal that demonetisation have significantly affected the digital adoption, usage of plastic money and m-wallet in the country.

## INTRODUCTION

In the late 20<sup>th</sup> Century, the Digital Revolution has driven the world towards digitalization. As per the World Economic Forum, digitalization has the potential to transform the world into a positive and sustainable way. It significantly contributes to society such as creating people for the machine age, building sustainable world and digital economy. It can generate at least 6 million job opportunities across the world in electronic and logistic industries by 2025. Digital initiatives undertaken by industries can reduce carbon emission by 26 billion tons from 2016 to 2025.

In India, Digital Revolution begun with 'Digital India' drive, a Government of India's flagship programme launched in July 2015. The main objective is to transform India into Digital India and make technology easily accessible, affordable, and useful for the Indian people. It was further catalyzed by demonetization policy on 8<sup>th</sup> Nov. 2016. Around eight years after it was launched, the GOI was successful in building a digital infrastructure as well as expands internet facilities throughout the country. Both the policies have benefitted the country to a large extent which revolutionized the digital payment system in the country. In 2021, India has recorded the largest number of RTGS (Real Time Gross Settlement) transactions with \$48 billion in the world which is 3 times higher than China (\$18 billion) and 6.5 times higher than US, Canada,

Germany, and France together (ACI Worldwide Report, April 1, 2022). The Digital India revolution has successfully raised the UPI transactions to US\$1 trillion in FY22 where 60 percent volume of retail payments in India was done via UPI (Iyer, 2022). Nonetheless, demonetization has strongly pushed the country towards digital banking systems such as e-banking and e-wallet for trade and commerce (Neralla, 2018). Hence, the present study attempts to explore and investigate the demand-side effects of demonetisation on digital adoption in the long run by using paired sample t-test.

## Critical Drivers of Digitalization in India

India turned into the second fastest growing digital economy in the world. The key drivers are:

- **Growing Internet Penetration:** As per the latest report of Digital 2023: India, the internet penetration has reached 692 million (48.7%) internet users in Jan 2023 while 730 million (51.3%) people still remains offline. There was a growth of 57 percent in the last 3 years owing to the large base of internet users in the country which is lowest cost per GB data which led to the highest consumption of data in the world. The average cost per GB of data is ₹50 per GB which is quite lower as compared to other countries.
- **Robust IT Sector:** IT sector significantly contributes to the digital revolution in India. The sector has grown around 15.5 percent i.e., two times greater than the country's GDP. The revenue of the sector has hit US\$ 227 billion and it directly employs 5 million people by FY22 (NASSCOM, Feb 2022).
- **Rising Smartphone Penetration:** In a study conducted by Deloitte, it was projected that the smartphone users in India will reach to 1 billion users by 2026. In Apr. 2023, India has above 600 million smartphone users which accounts for 38 percent of all network devices and within the next 5 years India is expected to become the world's second largest smartphone manufacturers.
- **Demographic Dividend:** India has reached to demographic dividend where large number of people is young at an average age of 29 years.

Globally, India is the youngest nation where above 68 percent of the people is below 40 years of age and out of which 70 percent of the people has access to internet facilities. Nevertheless, it is estimated that by 2030, the middle class in India will reach to one billion (i.e., 70%) people.

## Impact of Demonetization on Digital Adoption

Demonetisation denotes stripping of a country's currency from its use as legal tender (Balaji and Balaji, 2017). On 8<sup>th</sup> Nov 2016, an historic move has taken by the PM Narendra Modi to fight against corruption, removal of counterfeit currency, bring back black money from Swiss Bank and money launders, discourage cash transactions and counter terror financing. The government demonetised high value currency notes of Gandhian series of denomination Rs.500 and Rs.1000 called as Specified Bank Notes (SBNs). The value of such SBNs is worth Rs.15.4 trillion that constitutes 86.9 per cent of the total value of the currencies in circulation (Singh and Roy, 2017). The main aim of demonetisation was to reap the potential of medium-term benefits via reducing black money, corruption, terror funding, cashless economy through digitisation, increasing flow of financial savings and greater formulation of the economy. It will lead to higher tax revenues and GDP growth that could serve inclusive and stronger economy and enhance the platform for future growth in the economy. It has fostered e-transactions among the Indian people (Saini, 2015; Balaji and Balaji, 2017). It also compelled the informal sector to adopt digital mode of transactions (Ranade, A., 2017).

Demonetization has positively affected the digital payment transactions such as RTGS, NEFT, Mobile Banking, Prepaid Payments Interface, debit, and credit cards as given in sub-sections 1.2.1, 1.2.2 and 1.2.3 below:

## Impact of Demonetization on RTGS, NEFT and Mobile Banking Transactions

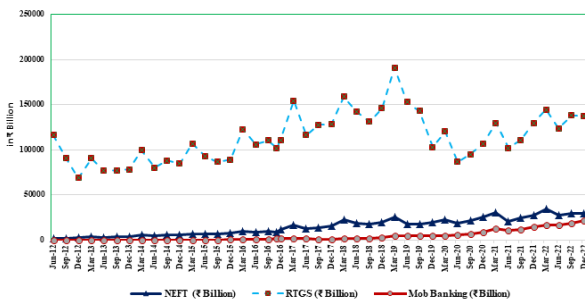
Figure 1 clearly reveals that the value of Real Time Gross Settlement (RTGS) transactions was much higher than both NEFT and Mobile Banking during

June 2012 to Dec 2022. However, there were huge fluctuations in the RTGS transactions during the period, especially in terms of total value of RTGS and customer transactions while interbank transactions remained more or less same.

The value of RTGS transactions have increased from ₹116373.57 billion in June 2012 to ₹137360.57 billion in Dec 2022. On the other hand, NEFT was ₹2072.12 billion and Mobile Banking was ₹3.07 billion during June 2012 which has increased to ₹29816.81 billion and ₹21341.23 billion during Dec 2022 respectively. However, at the time of demonetization (Nov 2016) the value of RTGS dropped to ₹101894.49 billion which then raised to ₹110980.33 billion in Dec 2016 i.e., after the announcement of demonetization of ₹500 and ₹1000 denomination notes. The RTGS transactions within a month had risen by 8.92% which further increases to 39% during March 2017 but in June 2017 it again declined by 25%. Nevertheless, the usage of RTGS post demonetization has increased at a CAGR of 0.42 percent i.e., from ₹101894.49 billion (Nov. 2016) to ₹ 137360.57 billion (Dec 2022). On the other hand, the NEFT transactions have raised at a CAGR of 1.71 % i.e., from ₹8807.88 billion in Nov. 2016 to ₹29816.81 billion in Dec 2022. Although, after the announcement of demonetisation, the Mobile transaction has raised at a CAGR of 3.89% (i.e., from ₹1365.7 billion in Nov 2016 to ₹21341.23 billion in Dec 2022). It clearly shows that demonetisation has driven the nation towards digital adoption.

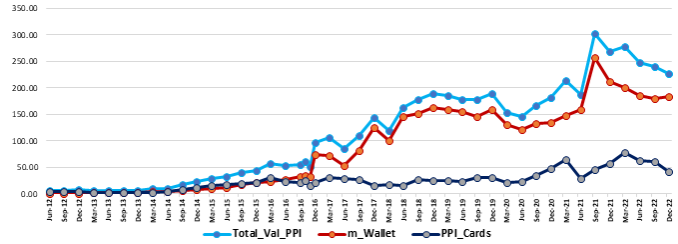
### Impact of Demonetization on Prepaid Payment Instruments in India (2012 to 2022)

Figure 2 clearly demonstrates that the total value of prepaid payment instruments (PPIs) has raised at a



Source: RBI Statistical Handbook

Figure 1: Impact of Demonetisation on Digital Payment - NEFT, RTGS and Mobile Banking (Jun 2012 to Dec 2022)



Source: RBI Statistical Handbook (Various)

Figure 2: Value of Prepaid Payment Instruments (PPIs) in ₹ Billion

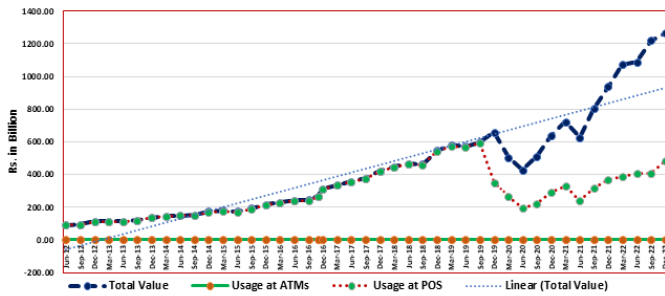
CAGR of 28.32% i.e., from ₹ 50.74 billion to ₹226.48 billion during Nov. 2016 to Dec 2022 while the value of m-wallet transactions had increased at a CAGR of 33.12% (i.e., from ₹33.06 billion to ₹184 billion) and the PPI card transactions had boosted by CAGR of 28.31% (i.e., from ₹15.34 billion to ₹42.48 billion) during the same period. Post demonetisation announcement the total value of PPIs transactions has raised to 93% from ₹50.74 billion in Nov. 2016 to ₹97.70 billion in March 2017 while the value of m-wallet transactions had increased at a CAGR of 14.50% (i.e., from ₹33.06 billion in Nov. 2016 to ₹74.48 billion in Dec 2016) and the value of PPI card transactions had raised at a CAGR of 5.28% (from ₹15.34 billion to ₹20.89 billion).

### Impact of Demonetization on Plastic Money Transactions in India (2012 to 2022)

The relevance and usage of plastic money such as credit cards and debit cards increase day-by-day in comparison to cash transactions. Although the pace has risen after the announcement of demonetization, Covid-19 pandemic has amplified its usage.

Figure 3 clearly reveals credit card transactions from June 2012 to December 2022. Both the total value of credit card transactions as well as usage at PoS are showing increasing trends from ₹312.37 billion in Dec.2016 to ₹377.76 billion in Sep 2019 which indicates that the total value of transactions and utilization at POS both had increased after the announcement of demonetization. However, due to Covid-19 pandemic and consequent lockdown the usage of credit cards at PoS initially declined and then tried to recover at a slower pace. Although, the usage of credit cards at ATMs were very low and





Source: RBI Statistical Handbook

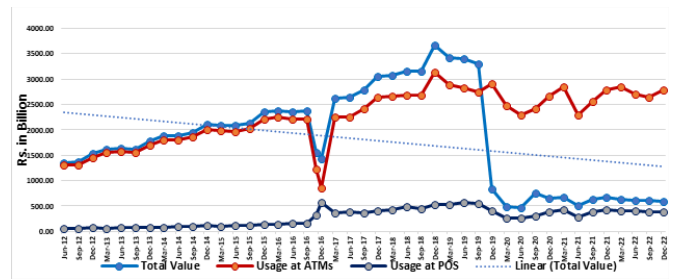
**Figure 3:** Trends of Credit Card Transactions (Jun 2012 - Dec 2022)

gradually increasing at a slower pace throughout these years.

Figure 4. clearly reveals the trends of debit card transactions which was initially increased from ₹1359.85 billion in June 2012 to ₹2379.08 billion in Sep 2016 and during demonetization period (Dec. 2016) it drastically dropped to ₹1429.65 billion due to cash crunch in ATMs and then gradually reinstated back to ₹2616 billion in March 2017. In Dec 2018, the total value has reached to the maximum limit with ₹3670.43 billion and then gradually plummets and reached to ₹586.26 billion on Dec 2022. However, usage at ATMs inclined from ₹849.34 billion in Dec 2016 to ₹ 2789.23 billion in Dec 2022. Although Jan 2017 onwards debits card transactions have picked its pace however, due to Covid-19 pandemic and resultant lockdown its total value and its usage at ATMs declined drastically. Nevertheless, debit card usage at PoS was very low and constant throughout these years. It indicates that the demonetization has positively impacted the usage of Debit cards at ATMs however, total value declined due to more usage of mobile banking (UPI) and e-banking.

### Impact of Demonetization on Indian Economy

Kumar & Kumar (2016) investigated the impact of demonetization on Indian economy w.r.t. consumption, bank deposits and money supply. The findings reveal the negative impact of demonetization on different sectors and persistence of the impact only in the short run, which can be overcome by government intervention. Patel (2019) examined the impacts of demonetization on India's GDP, stock market fluctuations, employment rate and on various sectors mainly focused on agriculture.



Source: RBI Statistical Handbook (Various)

**Figure 4:** Value of Debit Card Transactions (Jun 2012 - Dec 2022)

The study found that demonetization drive has short-term impacts over long-run especially in stock markets, and it negatively impacts the GDP growth rate. However, the policy didn't fulfil the main objectives. In an attempt to provide a better insight of demonetisation in India Lahiri, A. (2020) argued that demonetisation was a major monetary shock for the country that badly hit the Indian economy as 99 percent of the demonetized currencies either exchanged with new currency or demanded a new currency by the public. It failed to curb counterfeit currency and taxed undeclared income and black money however, 3.5 million people lost their jobs.

### Effects of Demonetization to Curb Black Money

Lahiri (2016) in a working paper of NIPFP examined the short- and medium-term effects of demonetization to curb black money in India and found currency crunch may adversely affect the country's economy and emphasized government intervention in curbing new black money from the country. Umamaheswari & Suganthi (2017) in their study analyzed the demonetization process and reveals that demonetization will gradually crowd out the small business from the market and compel people to utilize larger retail stores. They also bring to the notice that developing nations with large numbers of poor and illiterate people have no access to banking services. However, the cashless drive of the government has become insensitive for them.

### Impact of Demonetization on Financial & Banking Sector

Singh, H. et.al (2017) in an article published in RBI Bulletin, examined the impact of demonetization on financial sector and found that demonetization



has induced households to save money through formal channels, sharp decline in currency demand, surge in the number and deposits of PMJDY account which further enhanced financial inclusion in the country, rise in saving flows in debt-equity driven mutual funds and Life Insurances. The study concludes that the main challenge faced by the financial institutions was to channelize the funds for productive purposes. Sethi *et.al* (2018) investigates the impact of demonetization on monetary system in the long-run by using Bayer-Hanck cointegration between money supply, cash-in-hand, notes in circulation and demonetization dummy. They found that there is long run cointegration between the variables and demonetization has significantly affected cash-in-hand and notes in circulation, but ARDL test shows negative impact on money supply and cash-in-hand. Nevertheless, the study couldn't confirm demonetization as a successful government policy to curb black money and funding illegal activities. Neralla (2018) analyzed the demonetization impact on loans and advances of State Bank of India. The study used two-sample t-test to investigate the effects and reveals that there is no significant impact of demonetization on loans and advances of SBI in pre and post demonetization. Manocha *et.al* (2019) attempts to compare various mode of digital transactions and bring to light the need of digitalization in the financial sector. The study also examined the impact of demonetization on digital payment by utilizing 30 months data from Sep 2015 to Feb 2018 and tested by employing paired sample t-test. The study concludes that cash transactions still dominate the country and to boost the digital transactions government, banks and financial intermediaries should increase the digital awareness program. Wang (2019) explored the impacts of demonetization on financial sector of India based on last 3 years data. The study found positive impacts of demonetization on financial transactions such as rise in the total value and volume of credit and debit cards in Point of Sales and boost mobile payments. It also eliminates ₹4 billion counterfeit currencies from the country however, demonetization drive didn't achieve the main objectives of bringing back the black money from Swiss Bank.

Many researchers explored the impact of demonetization on different sectors such as banking

and financial services, digital adoption, agriculture, manufacturing, and service sectors as well as the overall economy. Although all the studies mainly focused on short-term impacts, no studies have concentrated to analyze the long-term demand side effects of demonetization on digital adoption. The present study will fill this gap by investigating the impact of demonetization on digital adoption in the country in the long run and also attempt to understand whether the policy was successful in the long run.

## Research Question and Aim

To find out whether demonetisation has affected the digital adoption in the long run. To answer this question the major aim of the present study is to analyse the demand-side effects of demonetisation on digital adoption in India in the long run.

## Research Objectives

To achieve the above aim the main objectives of the present study are as follows:

1. To analyse the recent trends of digital payment, prepaid payment instruments and plastic card transactions.
2. To explore the impact of demonetisation on e-banking services in India.
3. To examine the long-run demand-side effects of demonetization on digital adoption in India.

## Research Design and Research Method

A systematic research design postulates the framework or plausible pathway of the whole research. The present study has used analytical, and exploratory research designs in order to examine the effect of demonetization on digital adoption in India. The study first analyzes the data with theoretical underpinning and then empirically investigates the data. The study used trend analyses to understand the effect of demonetization on digital transactions in India during pre and post demonetization period. Quantitative research method has been used to analyze the quantitative attributes systematically by conducting secondary survey. Quantitative research will enable the researcher to better analyze both the short-run and long-run impacts. To investigate the



short-run and long-run impacts of demonetization, the study used paired sample t-test.

### Paired Sample T-Test

Paired sample t-test is also known as 'Dependent sample t-test', is used to compare the means of two paired groups of the same units or samples. It determines whether the mean difference between the two pairs is significantly different from zero or not. The test is a kind of inferential statistics that is used to derive conclusions about the population from the sample. The test compares the means of the same samples before and after the event has occurred. It is a parametric test. The dependent (test) variable measures the statistical differences between the paired samples in two different time periods in a continuous series i.e., normally distributed data.

Hypothesis of the paired sample t-test is:

$H_0: \mu_1 = \mu_2$ , "the paired population means are equal", i.e., the difference between the means of paired sample is equal to zero

$H_1: \mu_1 \neq \mu_2$  "the paired population means are not equal", i.e., the difference between the means of paired sample is not equal to zero

The test statistic of Paired Samples t-Test ( $t$ ) is given below:

$$t = \frac{\bar{x}_{diff} - 0}{s_{\bar{x}}}$$

where,

- $\bar{x}_{diff}$  = Sample mean of the differences
- $n$  = Sample size (i.e., number of observations)
- $s_{diff}$  = Sample standard deviation of the differences
- $s_{\bar{x}}$  = Estimated standard error of the mean ( $s/\sqrt{n}$ )

The calculated  $t$  value is then compared to the critical  $t$  value with  $df = n-1$  from the  $t$  distribution table for a chosen confidence level. If the calculated  $t$  value is greater than the critical  $t$  value, then we reject the null hypothesis and conclude that the means are significantly different.

### Hypotheses

There are three broad hypotheses given below:

- $H_{0a}: \mu_1 = \mu_2$ , The mean difference in digital payment transactions is equal to zero

- $H_{1a}: \mu_1 \neq \mu_2$ , The mean difference in digital payment transactions is not equal to zero
- $H_{0b}: \mu_3 = \mu_4$ , The mean difference in card payment transactions is equal to zero
- $H_{1b}: \mu_3 \neq \mu_4$ , The mean difference in card payment transactions is not equal to zero
- $H_{0c}: \mu_5 = \mu_6$ , The mean difference in m-wallet transactions is equal to zero
- $H_{1c}: \mu_5 \neq \mu_6$ , The mean difference in m-wallet transactions is not equal to zero

### Data Analysis And Interpretation

To examine the demand side effects of demonetization on banking services in India, the study used the value of digital payments (RTGS, NEFT and Mobile Banking), card payments (credit and debit cards) and m-wallet transactions in India. The monthly data has been collected from the Reserve Bank of India's database from April 2012 to December 2022. The section is divided into two parts – First, deals with measuring the effect of demonetization on digital payments in India and second, entails to analyze the effect of demonetization on card payment and m-wallet transactions in India.

To analyze the impact of demonetization on digital payments, card payments and m-wallets in India the study has utilized paired sample t-tests. The test will help to identify the mean differences between two paired groups. The paired t-test has been used not only to identify the impact of demonetization but also to analyze the extent the demonetization has impacted the digital transactions in India. The time-period under study has been divided into two paired groups - pre-demonetization period i.e., from Apr 2012 to Oct 2016 and post-demonetization period i.e., from Nov 2016 to Dec 2022.

### Demand Side Effects of Demonetization on Digital Payments

In order to investigate the first broad hypothesis of demonetization on digital payments, the following sub-hypotheses have been investigated:

- H0a<sub>1</sub>: There is no effect of demonetization on NEFT transactions.

**Table 1:** Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	NEFT_pre	503730.10	55	227130.51	30626.27
	NEFT_post	1779017.16	55	413316.90	55731.64
Pair 2	RTGS_pre	8340028.61	55	1434412.24	193416.11
	RTGS_post	11859173.54	55	2779891.57	374840.50
Pair 3	Mob_Banking_pre	20376.91	55	29337.83	3955.91
	Mob_Banking_post	401018.06	55	292468.26	39436.41

Source: Author's estimation based on RBI Data

H1a<sub>1</sub>: There is an effect of demonetization on NEFT transactions.

H0a<sub>2</sub>: There is no effect of demonetization on RTGS transactions.

H1a<sub>2</sub>: There is an effect of demonetization on RTGS transactions.

H0a<sub>3</sub>: There is no effect of demonetization on Mobile Banking transactions.

H1a<sub>3</sub>: There is an effect of demonetization on Mobile Banking transactions.

To measure the digital mode of transactions the study utilized National Electronic Fund Transfer (NEFT), Real Time Gross Settlement (RTGS) and Mobile Banking as the dependent variables. Table 1, the paired samples statistics reveal that there are significant mean differences between the NEFT, RTGS and Mobile Banking during pre and post demonetization periods. The mean difference of NEFT, RTGS and Mobile Banking are ₹1275287 crore, ₹3519145 crores and, ₹ 380641.15 crores respectively during pre and demonetization periods. It clearly indicates that the means of paired samples of NEFT, RTGS and Mobile Banking are significantly raised during the pre and post demonetization period.

Table 2 shows the correlation between the paired samples of NEFT, RTGS and Mobile Banking during pre and post demonetization periods. It clearly reveals that there is a highly significant relationship between pre and post demonetization NEFT, RTGS and Mobile Banking at 1 percent significance level. The correlation between pre and post demonetization NEFT and Mobile Banking transactions are 67 percent and 92 percent respectively while that of RTGS transactions is significant and -43 percent. It clearly indicates that demonetization has positively and significantly

affected NEFT and Mobile Banking transactions while it negatively and significantly impacts RTGS transactions.

Table 3 shows the results of paired samples t-test on digital payment transactions i.e., NEFT, RTGS and Mobile Banking which clearly reflects there is significant change on digital payments during pre and post demonetization period. We can reject the null hypothesis of zero mean differences by one percent significance level as the 2-tailed p-value is <0.05. The result clearly indicates that NEFT, RTGS and Mobile Banking transactions have significantly increased to ₹1275287.06 crore, ₹3519144.94 crore, and ₹380641.15 crore respectively because of demonetization policy. Hence, the findings reveal that demonetization played a very significant role in digital adoption in the country.

### Demand Side Effect of Demonetization on Card Payments and m-Wallets in India

To investigate the long-run demand-side effects of demonetization on digital adoption in India with respect to card payments and m-wallets in India the following seven hypotheses have been formulated: H0b<sub>1</sub>: There is no effects of demonetization on credit card usage

Table 2: Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	NEFT_pre & NEFT_post	55	.672	.000
Pair 2	RTGS_pre & RTGS_post	55	-.431	.001
Pair 3	Mob_Banking_pre & Mob_Banking_post	55	.920	.000

Source: Author's estimation based on RBI Data



**Table 3: Paired Samples Test**

Mean	Paired Differences	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference				
					Std. Deviation	Std. Error Mean	Lower	Upper	
					Pair 1	NEFT_pre - NEFT_post	-1275287.06	310276.46	41837.67
Pair 2	RTGS_pre - RTGS_post	-3519144.94	3636116.48	490293.85	-4502124.92	-2536164.96	-7.18	54	.000
Pair 3	Mob_Banking_pre - Mob_Banking_post	-380641.15	265713.46	35828.80	-452473.56	-308808.74	-10.62	54	.000

Source: Author's estimation based on RBI Data

H1b<sub>1</sub>: There is effects of demonetization on credit card usage

H0b<sub>2</sub>: There is no effects of demonetization on credit card usage at ATMs

H1b<sub>2</sub>: There is effects of demonetization on credit card usage at ATMs

H0c<sub>1</sub>: There is no effects of demonetization on credit card usage at PoS

H1c<sub>2</sub>: There is effects of demonetization on credit card usage at PoS

H0d<sub>1</sub>: There is no effects of demonetization on debit card usage

H1d<sub>2</sub>: There is effects of demonetization on debit card usage

H0e<sub>1</sub>: There is no effects of demonetization on debit card usage at ATMs

H1e<sub>2</sub>: There is effects of demonetization on debit card usage at ATMs

H0f<sub>1</sub>: There is no effects of demonetization on debit card usage at PoS

H1f<sub>2</sub>: There is effects of demonetization on debit card usage at PoS

H0g<sub>1</sub>: There is no effects of demonetization on m-wallets usage

H1g<sub>2</sub>: There is effects of demonetization on m-wallets usage

To analyse the above hypotheses the study used paired sample t-tests. The variables used under study are total value of credit card (CC) usage and CC usage at various ATMs and Point of Sales (PoS); total value of debit card (DC) usage and DC usage at various ATMs and PoS; total value of m-wallets usage at various points.

Table 5 shows the results of paired sample statistics on card payments and m-wallet transactions. The result clearly indicates that the mean value of Credit Card (CC) usage has increased by more than 3 times i.e., from ₹ 16254.02 crore to ₹49067.23 crore; the mean value CC usage at ATMs has increased less than double and, its mean value usage at PoS has raised by more than double (from ₹16062.12 crore to ₹ 38689.16 crore) during pre and post demonetization period respectively. Likewise, the average value of debit card usage has augmented from ₹191797.57 crore to ₹215130.48 crore; average usage at ATMs raised from ₹181448.88 crore to ₹249970.39 crore and average usage at PoS has boosted from ₹10348.69 crore to ₹41669.01 crore. Most interestingly, the average usage of m-wallet has drastically raised after demonetization i.e., from ₹956.11 crore to ₹12519.97 crore and average usage value at PoS increased from ₹26410.81 crore to ₹80358.17 crore.

Table 6 reveals the paired samples correlations of prepaid payments interface such as card payments and m-wallet transactions are significantly correlated with each other during the pre and post demonetization periods except credit card usage at various ATMs. Demonetisation has positively and moderately influenced the total value of credit card usage with 62 percent and weakly influenced debit card usage at various ATMs and usage of m-wallets with <40 percent correlation. However, it negatively and significantly impacted total value of debit card usage with -61 percent correlation and



**Table 5:** Paired Samples Statistics – Card Payments and m-wallet

Indicators	Mean	N	Std. Deviation	Std. Error Mean	
Pair 1	TotalVal_CCUsage_Pre_Demo	16254.02	55	5136.90	692.66
	TotalVal_CCUsage_Post_Demo	49067.24	55	12378.77	1669.15
Pair 2	CC_UsageVal_ATMs_Pre_Demo	191.91	55	64.68	8.72
	CC_UsageVal_ATMs_Post_Demo	304.97	55	91.53	12.34
Pair 3	CC_UsageVal_POS_Pre_Demo	16062.12	55	5074.65	684.27
	CC_UsageVal_POS_Post_Demo	38689.16	55	13689.09	1845.84
Pair 4	TotalVal_DCUsage_Pre_Demo	191797.57	55	35438.14	4778.48
	TotalVal_DCUsage_Post_Demo	215130.48	55	121810.74	16424.96
Pair 5	DC_UsageVal_ATMs_Pre_Demo	181448.88	55	31813.29	4289.70
	DC_UsageVal_ATMs_Post_Demo	249970.39	55	45777.72	6172.67
Pair 6	DC_UsageVal_POS_Pre_Demo	10348.69	55	3773.27	508.79
	DC_UsageVal_POS_Post_Demo	41669.01	55	11288.49	1522.14
Pair 7	TotalVal_PoS_Pre_Demo	26410.81	55	8813.95	1188.47
	TotalVal_PoS_Post_Demo	80358.17	55	24421.40	3292.98
Pair 8	mwallet_pre_Demo	956.10	55	978.65	131.96
	mwallet_post_Demo	12519.97	55	3471.78	468.13

Source: Author's estimation based on RBI Data

**Table 6:** Paired Samples Correlations - Prepaid Payments Interface (PPI) & M-Wallet

	N	Correlation	Sig.
Pair 1 TotalVal_CCUsage_Pre_Demo & TotalVal_CCUsage_Post_Demo	55	.615	.000
Pair 2 CC_UsageVal_ATMs_Pre_Demo & CC_UsageVal_ATMs_Post_Demo	55	-.114	.406
Pair 3 CC_UsageVal_POS_Pre_Demo & CC_UsageVal_POS_Post_Demo	55	-.359	.007
Pair 4 TotalVal_DCUsage_Pre_Demo & TotalVal_DCUsage_Post_Demo	55	-.605	.000
Pair 5 DC_UsageVal_ATMs_Pre_Demo & DC_UsageVal_ATMs_Post_Demo	55	.345	.010
Pair 6 DC_UsageVal_POS_Pre_Demo & DC_UsageVal_POS_Post_Demo	55	-.318	.018
Pair 7 TotalVal_PoS_Pre_Demo & TotalVal_PoS_Post_Demo	55	-.345	.010
Pair 8 mwallet_pre_Demo & mwallet_post_Demo	55	.326	.015

Source: Author's estimation based on RBI Data

weakly influenced credit card usage at various PoS, total value of debit card usage at PoS, total value of transactions at PoS with <40 percent correlation.

Table 7 clearly indicates the Paired Sample t-test of card payment and m-wallet transactions with 54

degrees of freedom (n-1) and 95 percent confidence interval around the mean differences. The result clearly reflects significant change in credit card transactions and its usage at various ATMs and PoS; debit card usage at various ATMs and PoS; total



**Table 7:** Paired Samples Test – Prepaid Payments Interface and M-Wallet

Indicators Mean		Paired Differences			t	df	Sig. (2-tailed)		
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower				Upper	
Pair 1	TotalVal_CCUsage_ Pre_Demo - TotalVal_ CCUsage_Post_Demo	-32813.21	10069.61	1357.79	-35535.41	-30091.02	-24.16	54	.000
Pair 2	CC_UsageVal_ATMs_Pre_ Demo - CC_UsageVal_ ATMs_Post_Demo	-113.07	117.96	15.91	-144.96	-81.18	-7.11	54	.000
Pair 3	CC_UsageVal_POS_Pre_ Demo - CC_UsageVal_ POS_Post_Demo	-22627.04	16217.59	2186.78	-27011.27	-18242.81	-10.35	54	.000
Pair 4	TotalVal_DCUsage_ Pre_Demo - TotalVal_ DCUsage_Post_Demo	-23332.91	145996.42	19686.15	-62801.27	16135.45	-1.19	54	.241
Pair 5	DC_UsageVal_ATMs_Pre_ Demo - DC_UsageVal_ ATMs_Post_Demo	-68521.52	45850.17	6182.44	-80916.55	-56126.48	-11.08	54	.000
Pair 6	DC_UsageVal_POS_Pre_ Demo - DC_UsageVal_ POS_Post_Demo	-31320.32	12991.29	1751.74	-34832.36	-27808.28	-17.88	54	.000
Pair 7	TotalVal_PoS_Pre_Demo - TotalVal_PoS_Post_Demo	-53947.36	28683.86	3867.73	-61701.69	-46193.03	-13.95	54	.000
Pair 8	mwallet_pre_Demo - mwallet_post_Demo	-11563.86	3285.18	442.97	-12451.97	-10675.75	-26.11	54	.000

**Source:** Author’s estimation based on RBI Data

value of transactions at PoS and m-wallets in post demonetization period and hence, we can reject the null hypothesis by one percent significance level as the 2-tailed p-value is <0.05. However, the mean differences of total value of debit card transactions are zero during pre and post demonetization as the 2-tailed p-value is >0.05 and hence, we cannot reject the null hypothesis. It clearly indicates demonetization has not significantly impacted the usage of debit cards.

Nevertheless, the paired sample test clearly demonstrates demonetization has positively and significantly impacted the plastic money and m-wallet transactions in the country. The result clearly indicates demonetization has significantly increased credit card transactions with ₹32813.21 crore, credit card transactions at ATMs with ₹113.07 crore and at PoS with ₹22627.04 crore. Similarly, demonetization raised the usage of debit card transactions at ATMs with ₹ 68521.52 crore and at

PoS ₹31320.32 crore. Similarly, m-wallet transactions drastically increased to ₹11563.86 crore and sales at PoS raised by ₹53947.36 crores after demonetisation. It reflects that demonetization plays a significant role in raising the card payment, PoS sales and m-wallet transactions in the country.

## FINDINGS & CONCLUSION

Demonetization has catalyzed the Digital India drive in India. The policy was initiated by the government with a positive vision to make India cashless and bring transparency. It aims to curb corruption, counterfeit currencies, and black money from the country. On the verge to make India cashless, demonetization plays a crucial role in the adoption of digital payment. On light of this, the present study aims to investigate the long run demand side effects of demonetization on digital adoption in India. The study initially conducted trends analysis of digital

payment modes (such as NEFT, RTGS and Mobile Banking) and Prepaid Payment Interface (includes m-wallets and plastic money i.e., credit and debit cards) transactions. To investigate the demand side effects of demonetization on digital adoption the study used paired sample t-test. The study found the mean differences between NEFT, RTGS and Mobile Banking were not zero and hence we reject the null hypothesis of no effects of demonetization on digital adoptions. Demonetization has positively and significantly affected NEFT and Mobile Banking while significantly and negatively influenced RTGS transactions in the country. On the other hand, the paired sample t-test reveals that there were significant mean differences of plastic money (credit cards and debit cards), m-wallet and PoS transactions between pre and post demonetization periods.

Nevertheless, demonetization has significantly and positively influenced NEFT, RTGS and Mobile banking transactions in India with one percent significance level. Likewise, it also positively and significantly affected the total value of credit card usage, its usage at ATMs and PoS, the usage of debit cards at ATMs and PoS, as well as total usage at PoS and m-wallet transactions. However, the total value of debit card usage was insignificant. Hence, the study concludes that demonetization played a very significant role in digital adoption in the country. However, despite the digital revolution cash transactions still play a dominant role over digital transactions. The reason is digital illiteracy and lack of awareness among the people, poor internet penetration especially in the remote areas and large number of untackled cybercrimes. However, with the recent government policy to launch the 5th Generation technology will enhance the internet speed and boost the digital drive in the country.

## Suggestions And Implications

The study suggests that demonetization policy of the government has significantly fostered digital adoption in the country in the long run but still a long way to go. However, the recent government approach to launch 5<sup>th</sup> generation and developing the infrastructure is a good decision which will further boost the digital and sustainable economy.

Hence, the policy is successful in driving digital adoption in the country.

## Limitations and Future Scope

The study is not free from shortcomings. First, demonetization has affected the whole country's economy due to currency crunch while the study mainly focused on digital adoptions. Second, the study mainly concentrated on examining the demand side effects of demonetization but ignored the supply side effects. In future research the supply side effects as well as the effect of demonetization on other sectors will also be taken into consideration to better understand the actual effects of demonetization in the long run.

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