

Cashless Future Ahead: Impact of Demonetization on ATM's and POS in select Banks

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Abstract: Our country India is moving towards Cashless economy. An economy said to be cashless where the transaction of money is in digital form other than cash. Demonetization brought a massive radical change in the transaction mode in the general public and the positive side to it is our nation had taken a greater leap towards a cashless economy. The growth in usage of plastic cards spiked post demonetization. As per RBI bulletin, realized in March 2017, credit card transactions were Rs.106.22 million and debit cards transactions were Rs.271.17 million. The present study focuses on the impact of number of ATM's (on site & off site) and POS and covers debit and credit cards in terms of volume of transactions during Pre-and Post-Demonetization period in select banks. The article also investigates the impact of the usage of NEFT, RTGS and mobile banking transactions in select banks. The present study examines the growth in number of ATM centers in both rural and urban areas. The entire study is based on secondary data, for statistical analysis, ANOVA, regression and paired t-test has been used. The paper would help in understanding the demonetization effect on the usage level of ATMs, POS debit cards and credit cards in terms of spending activity by the general public.

Keywords: Cashless economy, Demonetization, ATM, POS, Debit Card, Credit Card and Banks.

I. Introduction

India was a cash driven economy. According to Forbes report on 14th December 2016, 95% of transactions were in cash. Even today around 85% of payments globally are still made using cash. As per annual report of RBI dated 31st March 2016, bank notes in circulation was Rs. 16.42 trillion. Out of which 14.18 trillion were in Rs. 500 and Rs. 1000 denominations which came to around 86% of the overall bank notes.

Though the trend of non- cash transactions began during 1990s, by the year 2010 electronic banking and digital banking were widespread all over the world. The various corporates namely digital wallet system and PayPal supported the movement towards electronic and digital banking. Our country started embracing cash driven economy and started to move towards digital banking after Prime Minister, Narendra Modi announced withdrawal of Rs. 1000 and Rs. 500 currency notes from the circulation in November 2016. This initiative to transform India to the cashless economy and Demonetization encouraged digital and e- transactions.

According to NITI Aayog's report on the progress of digital payments, a sharp surge of 271% in digital payments was observed. The mobile wallet transactions also raised from 17 lakhs to 63 lakhs in the month of December 2016.

According to Mr. Vijay Shekhar Sharma, CEO, Paytm, 7% increase of customers was observed reaching the value of 160 million in less than a month post demonetization. Continuous reforms by the Government has a huge impact and the economy is moving towards cash less and becoming digital. In pre-demonetization period, majority of transactions were done in cash but the economy is slowly marching towards digitalization.

II. Key Concepts

Bank cards: Cards which are issued by a bank such as- Debit card, credit cards and prepaid cards.

Debit card: A card allowing the holder to transfer money electronically from their bank account when making a purchase

Credit card: A card issued by a bank allowing the holder to purchase goods or services on credit.

POS: Point of Sale (POS) terminals are deployed at merchant locations which facilitates users to swipe electronic cards for the payment.

NEFT (NATIONAL ELECTRONICS FUNDS TRANSFER SYSTEM): NEFT is one form of electronic funds transfer system which settles transactions in batches.

RTGS (Real Time Gross Settlement) settles the funds transfer continuously on order basis.

ATM Automated Teller Machine: ATM is a cash dispensing machine combined computer terminal, with cash vault and recordkeeping system in one unit.

Electronic Purses/Wallets: E-wallets (pay pal E- wallet) is a kind of virtual wallet with debit and credit card information along with cash. This is a virtual wallet that can store credit card, debit card and other information.

Debit & Credit Cards: A card which is used for payment using swipe card facilities at ATM or point of sale.

UPI Apps: A Mobile payment application system which facilitates the user to make transactions using smart phone. It allows transfer of money virtually. Examples include SBI pay, ICICI pocket, PNB UPI etc.

III. Review Literature

Akhalume, Ohiokha (2012), defined cashless economy as the economy where cash based transactions are at a very minimum and majority of the transactions are carried digitally.

Paul, Friday (2012) defined cashless transaction as the purchase which is made without cash and by using the electronic transfer.

Agba (2010) explained that an electronic or digital payment is a method used in the payment system using computers which helps in reducing fraudulent practices and encourages transparency.

Omotunde, Dewole (2013) described the cashless economy as the framework where payments are done using internet.

Gangopadhyay (2009) opined that infrastructure is one of the main influencing factor for the effective implementation of cash less economy in the country.

According to Enhancing Financial Innovation & Access (2013), it is inferred that there is a perfect correlation between the proportion that people banked and the proportion of transactions made electronically. He also emphasized that financial inclusion is required in order to transform into a cashless economy.

Bayero (2015) conducted a study to know the effects of cash less economic policy on financial inclusion in Nigeria. It was found that factors like consumer awareness, user value, and infrastructure have a greater significant relationship with financial inclusion.

Kumar (2017) conducted the study to know the effect of demonetization on people in Coimbatore district. The main findings were that the four variable namely gender, annual income, age and occupation are the major influential factors.

Review of various relevant literature considered in the current study reveals lack of inclusive empirical research on the impact of demonetization on ATM s and POS Pre-and Post-Demonetization. Based on the gap found, the following study has been undertaken.

IV. Objectives of the study

- To examine the impact of number of ATM's (on site & off site) and POS and the volume of transactions in both debit and credit cards Pre-and Post-Demonetization period in select banks.
- To investigate the impact of the usage of NEFT, RTGS and mobile banking transactions in select banks.
- To study and examine the growth in number of ATMs' in both rural and urban areas.

V. Research Methodology

The study is based on secondary data collected from the various volumes of banking statistics published by Reserve Bank of India and Indian Banks Association, for the year 2016-17 (Pre-and Post-Demonetization period). The variables considered are number of ATM centers, number of POS, NEFT and RTGS transactions, the amount of debit card transactions, the amount of credit card transactions with regard to both ATM and POS banks in India. The various statistical tools such as ANOVA, Regression and Paired t-test are used to analyze the data.

Hypotheses:

- H01: There is no significant difference between the number of ATM's dispersed in various regions of India.
- H11: There is a significant difference between the number of ATM's dispersed in various regions of India.
- H02: There is no significant difference in Pre-and Post-Demonetization effects on regional distribution of ATM's.
- H12: There is a significant difference in Pre-and Post-Demonetization effects on regional distribution of ATM's.
- H03: There is no significant difference between the number of ATM's and amount of Debit card transactions post demonetization.
- H13: There is a significant difference between the number of ATM's and amount of Debit card transactions post demonetization.
- H04: There is no significant difference between the number of ATM's and amount of Credit card transactions post demonetization.
- H14: There is a significant difference between the number of ATM's and amount of Credit card transactions post demonetization.
- H05: There is no significant difference between the number of POS and amount of Debit card transactions post demonetization.
- H15: There is a significant difference between the number of POS and amount of Debit card transactions post demonetization.
- H06: There is no significant difference between the number of POS and amount of Credit card transactions post demonetization.
- H16: There is a significant difference between the number of POS and amount of Credit card transactions post demonetization.
- H07: There is no significant difference in Pre-and Post-Demonetization effects on number of ATM's, POS, Amount of ATM and POS Debit card and credit card transactions.
- H17: There is a significant difference in Pre-and Post-Demonetization effects on number of ATM's, POS, Amount of ATM and POS Debit card and credit card transactions.
- H08: There is no significant difference in Pre-and Post-Demonetization effects on NEFT and RTGS transactions.
- H18: There is a significant difference in Pre-and Post-Demonetization effects on NEFT and RTGS transactions.

VI. Data Analysis and Interpretation

For the study, data on number of ATM centers, number of POS, NEFT and RTGS transactions, the amount of debit card transactions, the amount of credit card transactions with regard to both ATM and POS related to banks in India during the period of Pre-and Post-Demonetization is considered.

Region wise ATM centers dispersion

The data are given region-wise, comprising of Metro centers, Urban centers, Semi-Urban centers, Rural centers during the period of Pre-and Post-Demonetization period in the Table 1.

Table 1: Region-Wise Deployment of ATM Centers

Name of the Bank/ Entity	Metro Centers	Urban Centers	Semi - Urban Centers	Rural Centers	Total
Pre	54307	58437	54788	35535	203067
Post	59097	56615	56689	34963	207364

The hypothesis taken for the study has been tested using Single factor ANOVA tool. The output is given in tables 2-5. It is seen that there is significant difference between regions relating to dispersion of ATM centers in both Pre-and Post-Demonetization period.

Table 2: Region-wise ATM's during Pre-demonetization period: Descriptive Statistics

SUMMARY				
Groups	Count	Sum	Average	Variance
Metro Centers	46	54307	1180.587	3879368
Urban Centers	46	58437	1270.37	6216153
Semi - Urban Centers	46	54788	1191.043	5712235
Rural Centers	46	35535	772.5	1539422

TABLE 3: Region-wise ATM's during Pre-demonetization period: ANOVA Results

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	6946582	3	2315527	0.533926	0.049592	2.654792
Within Groups	7.81E+08	180	4336795			
Total	7.88E+08	183				

TABLE 4: Region-wise ATM's during Post demonetization period: Descriptive Statistics

SUMMARY				
Groups	Count	Sum	Average	Variance
Metro Centers	41	59097	1441.39	4955373.8
Urban Centers	41	56615	1380.854	8370717
Semi - Urban Centers	41	56689	1382.659	9917618.4
Rural Centers	41	34963	852.7561	2447698

TABLE 5: Region-wise ATM's during Post demonetization period: ANOVA results

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	9361234	3	3120411	0.4858296	0.006259	2.661108
Within Groups	1.03E+09	160	6422852			
Total	1.04E+09	163				

Table 6 indicates that there is a significant difference (p-value) in the Pre-and Post-Demonetization effects on regional distribution of ATM's. There is a difference in dispersion of ATM centers post demonetization due to the transition of people towards cashless economy.

TABLE 6: Pre-and Post-Demonetization Effects with respect to ATM centers

t-Test: Paired Two Sample for Means		
	Post Demonetization	Pre-Demonetisation
Mean	51841	50766.75
Variance	127936866.7	106514254.9
Observations	4	4
Pearson Correlation	0.967667021	
Hypothesized Mean Difference	0	
Df	3	
t Stat	0.535650834	
P(T<=t) one-tail	0.025761994	
t Critical one-tail	2.353363435	
P(T<=t) two-tail	0.051523988	
t Critical two-tail	3.182446305	

A regression model has been used regressing amount of transactions (dependent variable) on the determining variable which is the, number of ATMs in both Pre-and Post-Demonetization period. R square is found to be 0.978. The value of Adjusted R² 0.971 means that 97 per cent of the variation in amount of debit card transactions is explained by the number of ATM centers which makes the model very explanatory. The ANOVA output (Table 7), shows that the regression model is a good fit, the significant F value 1.6E-33 being less than the level of significance of 0.05.

The regression statistics (Table 8) reveal that the p-values for the coefficients are less than 0.05 level of significance for debit cards transactions. These values are interpretable. Thus, the regression model is formulated as equation (1) below.

$$D = 19136.3 - 0.16 \text{ ATM} \dots (1)$$

It is observed from the equation (1) that an addition of an ATM center will result in a decrease in debit card transaction by Rs.0.16 million post demonetization period. This implies that it is not advisable to add ATM centers when the Government has taken the initiative to move towards cashless economy.

TABLE 7: ANOVA Results for Amount of Debit Card Transactions and ATM Centers Post demonetization

ANOVA					
	Df	SS	MS	F	Significance F
Regression	1	9.64E+11	9.64E+11	1072.371	1.6E-33
Residual	46	4.13E+10	8.99E+08		
Total	47	1.01E+12			

TABLE 8: Regression Statistics: Coefficients and Test Results for Amount of Debit Card Transactions and ATM Centers

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	19136.3	4815.325	3.97404	0.000247	28829.1	9443.56
ATM	-0.1609389	0.49146	-32.74707	1.6E-33	-15.10463	-17.08315

Now, turning to the relationship between amount of credit card transactions and ATM centers, when amount of credit card transactions (dependent variable) is regressed on ATM centers, R square is found to be 0.77. The value of Adjusted R² 0.76 implies that 76 per cent of the variation in profit is explained by business which makes the model well explanatory. The ANOVA output (Table 9), shows that the regression model is a good fit, the significant F value 7.95E-16 being less than the level of significance of 0.05.

The regression statistics (Table 10) reveal that the p-value for the coefficient for business is less than 0.05 level of significance and thus coefficient value is interpretable. The regression model is formulated as equation (2) below.

$$Cr = 270.9244 - 0.118 \text{ ATM} \dots (2)$$

Equation (2) indicates that increase of one ATM center decreases amount of credit card transactions by Rs.0.118 million post demonetization.

TABLE 9: ANOVA Results for Amount of Credit Card Transactions and ATM Centers Post demonetization

ANOVA					
	Df	SS	MS	F	Significance F
Regression	1	1.24E+10	1.24E+10	145.0814	7.95E-16
Residual	46	3.92E+09	85162708		
Total	47	1.63E+10			

TABLE 10: Regression Statistics: Coefficients and Test Results for Amount of Credit Card Transactions and ATM Centers

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	270.9244	1464.044	0.185052	0.0454002	2676.04	3217.892
ATM	-0.118062	0.014247	-8.28697	1.12E-10	-0.089385	-0.146739

Turning to the relationship between amount of debit card transactions and POS centers, when amount of debit card transactions (dependent variable) is regressed on POS centers, R square is found to be 0.81. The value of Adjusted R² 0.79 implies that 79 per cent of the variation in amount of debit card transactions is explained by the number of POS which makes the model well explanatory. The ANOVA output (Table 11), shows that the regression model is a good fit, the significant F value 7.95E-16 being less than the level of significance of 0.05.

The regression statistics (Table 12) reveal that the p-value for the coefficient for amount of debit card is less than 0.05 level of significance and thus coefficient value is interpretable. The regression model is formulated as equation (3) below.

$$D = 270.9244 + 0.12POS \dots (3)$$

Equation (3) shows that a unit of increase in number of POS will increase the amount of debit transactions post demonetization by Rs. 0.12 million.

TABLE 11: ANOVA Results for Amount of Debit Card Transactions and POS Post demonetization

ANOVA						
	Df		SS	MS	F	Significance F
Regression	1		1.24E+10	1.24E+10	145.0814	7.95E-16
Residual	46		3.92E+09	85162708		
Total	47		1.63E+10			

TABLE 12: Regression Statistics: Coefficients and Test Results for Amount of Debit Card Transactions and POS

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	270.9244	1464.044	0.185052	0.034002	2676.04	3217.892
POS	0.121221	0.010064	12.04498	7.95E-16	0.100963	0.141479

Now, turning to the relationship between amount of credit card transactions and POS, when amount of debit card transactions (dependent variable) is regressed on POS, R square is found to be 0.77. The value of Adjusted R² 0.76 implies that 76 per cent of the variation in amount of credit card transactions is explained by the number of POS which makes the model well explanatory. The ANOVA output (Table 13), shows that the regression model is a good fit, the significant F value 1.12E-10 being less than the level of significance of 0.05. This implies that the post demonetization the number of debt and credit transactions in the POS has increased indicating the move towards the cashless economy

The regression statistics (Table 14) reveal that the p-value for the coefficient for amount of credit card is less than 0.05 level of significance and thus coefficient value is interpretable. The regression model is formulated as equation (4) below

$$Cr = 677.3053 + 0.13 POS \dots (4)$$

Equation (4) shows that a unit of increase in number of POS will increase the amount of credit transactions by Rs. 0.13 million post demonetization.

TABLE 13: ANOVA Results for Amount of Credit Card Transactions and POS Post demonetization

ANOVA						
	Df		SS	MS	F	Significance F
Regression	1		1.17E+10	1.17E+10	68.67388	1.12E-10
Residual	46		7.85E+09	1.71E+08		
Total	47		1.96E+10			

TABLE 14: Regression Statistics: Coefficients and Test Results for Amount of Credit Card Transactions and POS Centers

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	677.3053	2072.497	0.326806	0.045297	3494.42	4849.026
2027	0.131062	0.014247	8.28697	1.12E-10	0.089385	0.146739

Table 15 indicates that there is a significant difference (p value 0.03<0.05) in Pre-and Post-Demonetization effects on number of ATM's, POS, Amount of ATM and POS Debit card and credit card transactions. This implies that the economy has initiated towards cashless scenario.

TABLE 15: Pre-and Post-Demonetization Effects with respect to ATM's, POS, Amount of ATM and POS Debit card and credit card transactions.

t-Test: Paired Two Sample for Means		
	Post Demonetisation	Pre-Demonetisation
Mean	1045167.639	718073.3536
Variance	1.60554E+12	8.30107E+11
Observations	6	
Pearson Correlation	0.927205512	
Hypothesized Mean Difference	0	
Df	5	
t Stat	4.475631141	
P(T<=t) one-tail	0.010003245	
t Critical one-tail	1.945048373	
P(T<=t) two-tail	0.03000649	
t Critical two-tail	2.570581836	

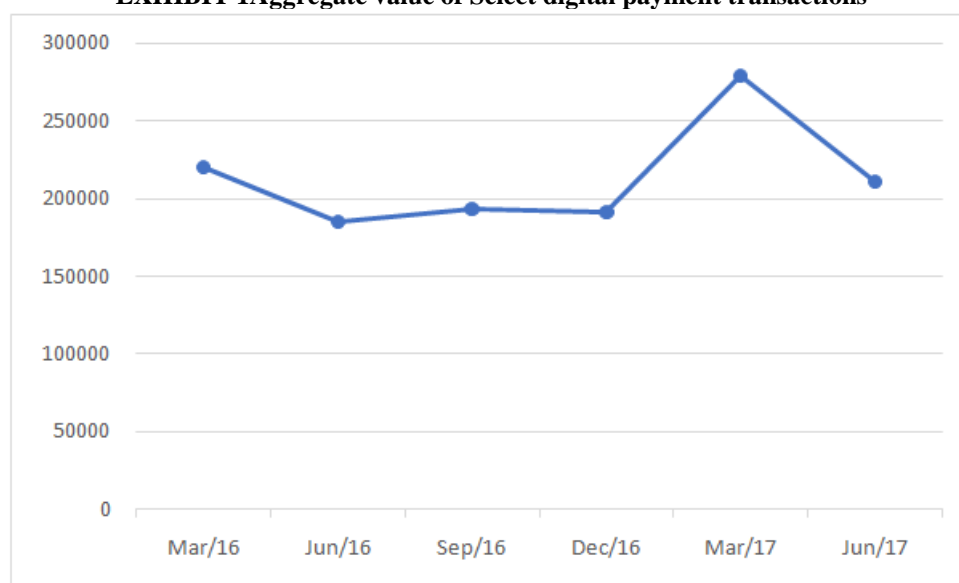
Table 16 indicates that there is a significant difference (p value $0.049 < 0.05$) in Pre-and Post-Demonetization effects with respect to NEFT and RTGS transactions. This indicates that the digital payments through NEFT and RTGS have increased post demonetization.

TABLE 16: Pre-and Post-Demonetization Effects with respect to NEFT and RTGS transactions

t-Test: Paired Two Sample for Means		
	Post Demonetization	Pre Demonetization
Mean	12629956.16	8882591.17
Variance	3.1062E+14	1.52835E+14
Observations	2	2
Pearson Correlation	0.9	
Hypothesized Mean Difference	0	
Df	1	
t Stat	1.007182405	
P(T<=t) one-tail	0.024886098	
t Critical one-tail	0.313751515	
P(T<=t) two-tail	0.049772196	
t Critical two-tail	0.806204736	

One of the ways to find out if digitalization has increased is to analyze the aggregate value of transactions under electronic payments system (EPS) released by Reserve Bank of India (RBI). The total value of all transactions under EPS has been broadly unchanged since demonetization, barring a seasonal spike in March according to Exhibit 1. However, the volume of transaction has witnessed a durable increase implying a significant fall per transaction.

EXHIBIT 1Aggregate value of Select digital payment transactions



Source: Reserve Source: RBI, MoSL

Exactly a year ago, the drastic step of demonetizing Rs. 500 and Rs.1000 in the economy had a great impact than expected. The main stated objective was to remove black money from the system, formalizing the economy, expanding the tax collection base, chocking funds for terrorism and curtailing fake not market. The finance minister stated that 83% of the currency in pumped back in the economy. After the note ban, government moved to less cash economy from the aim of cash less economy.

According to RBI, Rs. 41.4 crores of rupees were detected and deposited in banks which is around 0.003 % of the total amount deposited, demonetizing 83% of the currency to weed 0.003 percent by spending around Rs.4554 crores towards cost of new note printing is absurd.

According to the report given by economic survey, earlier it was estimated that the tax additional tax collections would be Rs. 10587 crore due to demonetization.

In 2016-17 which will be around 11.1 percent share of the GDP and it was expected to 11.3 percent in 2017-18 which is a mere 0.2 percent increase expected.

Cashless economy and digital boom were observed where many small businesses and hawkers adopted POS and payment apps between November 2016 to March 2017. At present our country may not be considered as cashless economy. Though people adopted technology, the surcharge on card transactions imposed by RBI at 2 percent forced people to go back on cash transactions.

Demonetization have a heavy toll on our economy. It influenced the growth of GDP. GDP growth rate in the second quarter of 2017 has come down to 5.6 percent which is the lowest in the last three years.

Effect of demonetization also did not put a complete check on Hawala operations. Within few weeks after demonetization, several gangs were caught in possession of new currency notes. They were exchanged for old notes for a commission. Revenue intelligence wing also seized large amount of foreign currencies.

VII. Conclusion

Although the volume of digital transactions almost doubled during the demonetization period, they have remained broadly unchanged in 2017, which questions the structural shift towards higher digitization in the economy. One could argue that even 0.83% is much higher than what it would have been without demonetization; however, considering such low base and the extent of the historic movement, it is believed that the fall in the share of digitization (using limited database) so early is not encouraging.

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