FERGUSSON COLLEGE, PUNE

DEPARTMENT OF STATISTICS

Topic: -

"MODI"FIED INDIA

USE OF E-BANKING

"Modi"fied India Use of E-Banking

Department of Statistics
Fergusson College, Pune.

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Every work accomplished is a pleasure, a sense of satisfaction. However, a number of people always motivate, criticize and appreciate a work with their objective opinions. Hence, we would like to use this opportunity to thank all, who have directly or indirectly helped us to accomplish this project.

First, we would like to thank our project guide Prof. Shital K. Gadekar without whose support this project could not have been completed. We would also express our gratitude for our Head of the Department Prof. Subhash S. Shende for whole-hearted co-operation and guidance. In addition, we would like to thank our department, the teachers, and the non-teaching staff for their support. We would also like to thank our friends who rendered their whole-hearted cooperation in the successful completion of the project work.

In addition, we would like to express our gratitude towards the respondents who helped us for our survey. This project would not have been completed without their participation.

We take special pleasure in acknowledging our college for providing all the facilities for our project work.

CERTIFICATE

This is to certify that Mr. /Miss ……………………   Roll No. -   ………..
Student of T.Y.B.Sc. Statistics of Fergusson College, Pune-411004, has satisfactorily completed the project on "E-banking in India" partial fulfillment towards Statistics practical paper [STS-3613] for the Academic year 2019-2020.

This information submitted in this project is true and original to the best of my knowledge.

Prof. Shital K. Gadekar   **Prof. Subhash S. Shende**

  (Project Guide)   (Head of Department)

INTRODUCTION

Almost three years ago, on 8th Nov 2016 Prime Minister Narendra Modi announced the withdrawal of high-value currency notes namely, Rs. 500/- and Rs. 1000/- denomination. These denominations almost amounted to 86% of currency in circulation. The major objective of demonetization by GOI was supposed to be- an attack on black money, on counterfeit notes, and projected as part to promote digitalization and cashless economy.

In this project, it is proposed to empirically study the E-Banking usage rate. The results are not conclusive but they are suggestive and provide good intuition for further research.

This study is based on monthly data collected for before and after demonetization from the Reserve Bank of India (www.rbi.org.in) as well as sample, survey through questionnaire was conducted by us.

Demonetization was initiated with a wide array of motives like stripping the Indian economy of its black money, push people to pay taxes for the unaccounted pile of cash, curb terrorism, promote the digital India movement and make India a cashless economy.

The term Internet Banking or E-Banking Internet both are used as supplement. EBanking is the one of the major part of E-Financing. Internet banking refers to the deployment over the Internet of retail and wholesale banking services. EBanking uses the web browser for the user interface and the Internet for data transfer and download of software, and so has a potential for reducing maintenance costs. For users, E-Banking provides current information, 24-hoursa-day access to banking services. The primary services provided by e-banks are transferring money among one's own accounts, paying bills, and checking account balances. Loans, brokering, share trading, service bundling, and a host of other financial services are being added to these primary services

MOTIVATION

When demonetization was announced on 8th November 2016, we (the youth of the nation) were first to adapt to this change of digital payment system. Although the step taken has its pros and cons it revolutionized the cash flow of this country, making the black money difficult to flow but also making it inconvenient for the older generation to handle money.

Earlier we used to carry cash everywhere we went, sometimes we waited for hours in ATM queue to get cash but after demonetization and availability of ebanking our life became pretty easy. Now-a-days even small shops around the country take money by Paytm or Google pay. As a 20th century born we have seen use of cash and were comfortable spending notes or coin but with increase in use of e-banking it made us realize that it is really convenient to use digital payment method. So we have selected this project to verify that is this method better than using physical money.

With this digital revolution, we as a responsible citizen of this country wanted to verify whether this revolution is what our country needed and is it going to revolutionized our industries, private or service sector.

Therefore, with this thought we led this project, started collecting data, and used our knowledge of Statistics and Digital impact on business/things around us.

OBJECTIVES

- ➢ To determine the impact of demonetization on E-Banking.
- ➢ To analyse the growth of E-banking.
- ➢ To identify the reasons for preferring E-Banking.
- ➢ To analyse the awareness of E-banking services.
- ➢ Indian currency (pre and post demonetization).
- ➢ Bring out the issues and challenges faced in effective utilization of E Banking services in India.

ABSTRACT

The purpose of our project was to study how many percentage of people in Pune use online/E-banking compared to India. We wanted to see whether occupation, age and gender is dependent or not on the use of online banking.

In our project, we collected a random sample from Pune city. For this randomness, we applied run test to check whether sample is random or not. First, we applied Exploratory Data Analysis for our sample. To get the results confirmed we moved forward for confirmatory data analysis.

In confirmatory data analysis, we calculated the proportion of our sample (proportion of people using online banking in Pune) and compared it with the proportion of people using online banking in India. We also performed proportion test for people using G pay, Paytm Phone pe for our sample and compared with it with the population proportions for the respective applications (apps). We also checked whether gender, age and occupation are dependent on use of online/EBanking or not by using Chi-Squared test.

Then we went for the analysis for our secondary data, which included the monthly data for amount transacted, by NEFT and RTGS, which was directly available on RBI website. For this data, we applied time series analysis and forecasted the transaction amount for next 24 months.

KEYWORDS

1. Exploratory data analysis

2. Confirmatory data analysis ☐ Chi squared test
   ☐ Proportion test

3. Time series analysis

4. Estimation of population proportion based on sample proportion.

TERMS USED IN THE PROJECT:

1)   **E Wallets** – E Wallets have become very famous nowadays. After demonetization, use of e-wallets has been implemented at a very largescale. These e wallets allow users to make payments using your mobile number or by scanning a QR code which takes place in a jiffy manner. All you need to do is simply download a wallet like PAYTM.

2)   **UPI** – UPI also known as Unified Payments Interface is another great way to go cashless. Unified payments interface also called UPI is system of payments. Using unified payments interface, people can transact using their smart phones. To pay using this system called unified payments interface, one needs 2 important things namely Smartphone and a Bank Account.

3)   **Plastic Money** – Plastic Money means debit cards and credit cards that are used at ATM's for cash withdrawal and POS machines while shopping. Having a debit or credit cards make you burden free from carrying cash.

4)   **Net Banking** – Net Banking is another handy way to get cashless transactions done. All you need is a bank account with e banking facility enabled on it. You can transfer funds to others account from the comfort of your home. There is no need of going to your bank to get transfers done. You can make all payments and transfers yourself. This is a very convenient way to go cashless in India as well.

5)   **Aadhaar Card** – Aadhaar Card enabled payment system allows a person to pay using his Aadhaar card if it is linked to his bank account. Once you link your Aadhaar card to your bank, you can make payments using your fingerprints.

METHODOLOGY

Exploratory Data Analysis:

It is an approach to analysing data sets to summarize their main characteristics, often with visual methods. Primarily Exploratory Data Analysis is for seeing what the data can tell us beyond the formal modelling or hypothesis testing task.

For our primary data, we applied exploratory data analysis for different attributes. For this, we have applied pie charts and bar plots etc. Based on our exploratory analysis results we move forward to make it confirm by using Confirmatory Data Analysis.

Confirmatory Data Analysis:

It is the part where you evaluate your evidence using traditional statistical tools such as significance, inference, and confidence. Here for our project we have used proportion test and chi-square test (testing for attributes).

Time Series Analysis:

1. Time series plot: - We have first plotted the time series for given data of RTGS and NEFT transaction amounts.
2. ACF and PACF: - Then we plotted the ACF and PACF plots that are the autocorrelation function and partial autocorrelation function.
3. Stationarity tests: - We use BOX-JENKINS model of having stationary time series. Hence, the first step in the analysis is therefore to make our series stationary.
   a) Time series plot-constant mean and variance implies stationarity
   b) Trend stationarity-remove a trend/slope and the series that is left is stationary.
4. Differencing: - Then we have used the method of differencing in order to make the time series stationary, which implies removing trend and seasonality in order to maintain constant mean and variance. We defined the lag to be used for differencing.
5. Differenced Time Series: - We have plotted the time series for the data after differencing. This gives us a new time series whose stationarity is tested using Augmented Dicky-Fuller (ADF) and Kwiatkowski PhillipsSchmidt-Shin (KPSS) tests and if the test is a success then the time series is eligible for further analysis for fitting of model.

6. <u>ACF and PACF</u>: - Now we again plot the ACF and PACF plots for the differenced time series. Once we have found the stationary form of the series we look at the ACF and PACF plots to determine the form of the ARIMA (p, d, q) model for the stationary series.

MODEL	ACF	PACF
White noise	All zeros	All zeros
AR(p)	Exponential decay	p significant lags dropping to zero
MA(q)	q significant lags before dropping to zero	Exponential decay
ARMA(p,q)	Decay after q^{th} lag	Decay after p^{th} lag

7. <u>Model suggestion</u>: - Based on the ACF and PACF plots, we determined the values of the parameters p and q. This is our first model suggestion that can be fitted to the time series.

8. <u>Model fitting</u>: - Now we have fitted the model using the p and q values obtained. We then write the model in the form ARIMA (p, d, q). We may have other possible models with different values of p and q that can be fitted. The model that has minimum AIC value among the selected fitted models will be the best fit.

TECHNICAL STATEMENT:

As our sample should be a good representative of Pune's population, we collected the data from different areas of Pune. Our main objective was to check what proportion of people in Pune use online banking/E-Banking compared to India. The data, which we have obtained, has different attributes like occupation, age, gender, preferred mode of online banking/E-Banking etc. We want to see whether there is dependency of such attributes on the use of online banking. In addition, we want to check whether people in Pune are aware of the services provided (like cashback) by the apps. We want to check how much secure is this online banking system is i.e. we asked people that have they ever faced online frauds. From this, we can get an idea about the security provided by digitalized system. Using secondary data for the transactions by (i.e. amount transacted) NEFT and RTGS (before demonetization and after demonetization), we want to use time series to predict the amount that should be transacted in each month by NEFT and RTGS for the next 24 months. We also want to estimate population proportion based on sample proportion.

STATISTICAL STATEMENT:

When we obtained our primary data, we had to do data cleaning. Then for our sample to be a good representative of Pune's population, we made different areas to combine to form a one area (as we combined Kothrud, Karve nagar as one area, Pimpri Chinchwad, Nigdi as one area and so on). After that, we want to apply exploratory data analysis following which is our confirmatory data analysis. Then we want to apply time series analysis for secondary data of transactions of money through NEFT and RTGS. With which we want to forecast the amount that should be transacted in next 24 months for each month.

METHOD OF DATA COLLECTION

Primary data collection:

For our project, we have used primary as well as secondary data. We have collected primary data through questionnaire. We generated a google form, which had different categorical questions (different attributes like age, gender, occupation). We tried to avoid personal questions so that respondents should not hesitate to answer. We collected a data through different areas of city by personal interaction with people. We have in all 650 responses.

Secondary data:

We obtained secondary data through different sites with help of search engine (Google). However, we have taken all the data through trusted sites like RBI (Reserve Bank of India) on which we are going apply time series.

EXPLORATORY DATA ANALYSIS
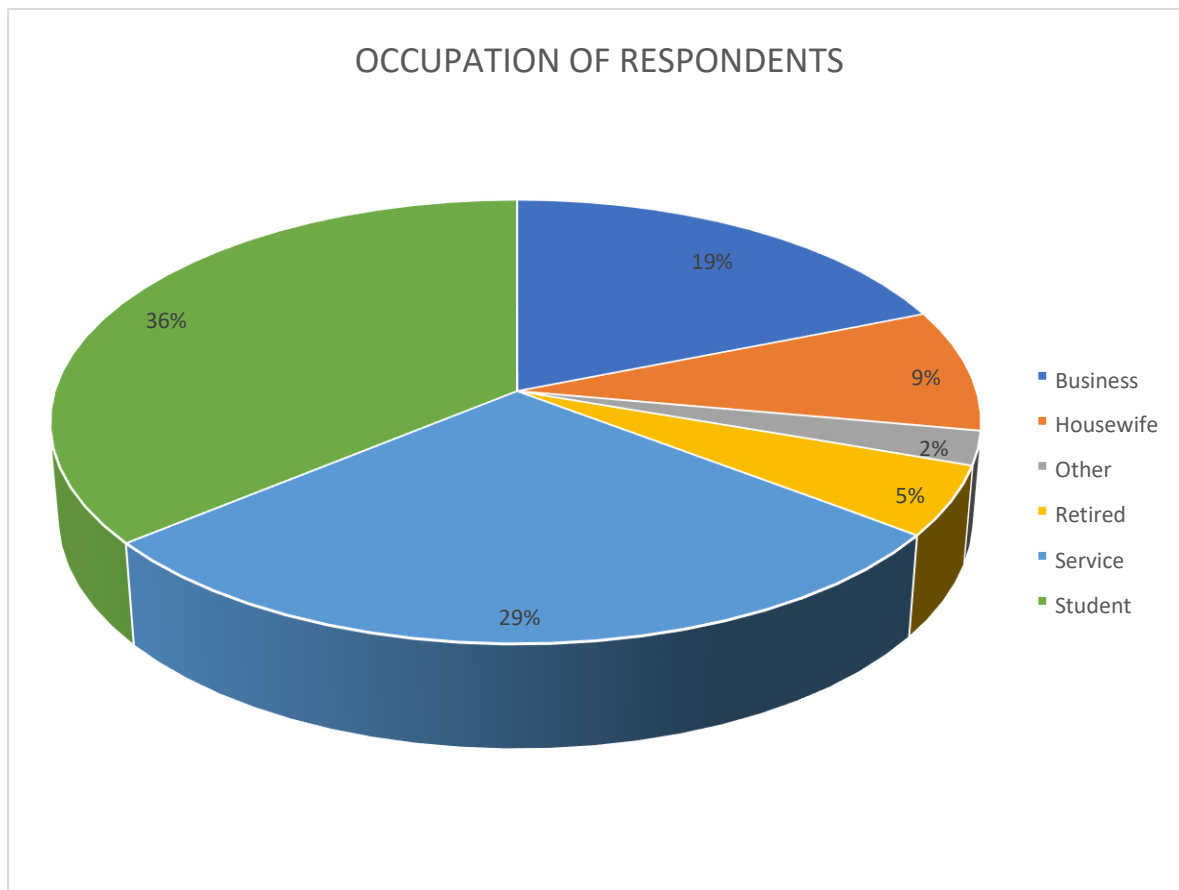
Graph of Age of respondents
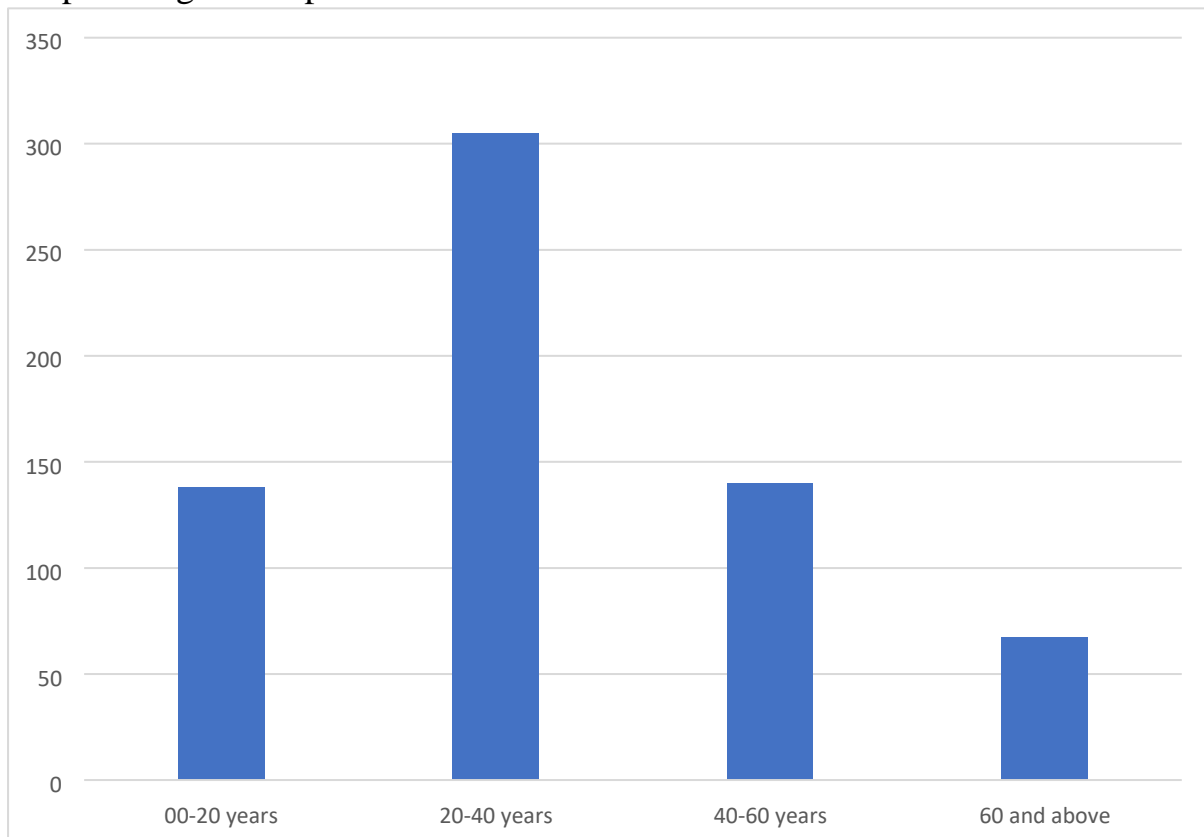
Interpretation:

We have provided the respondents with 4 different age group intervals that they could choose from, starting from 00-20 years and finishing with 60 and above. Above figure shows that 138 participants are within the age group of 00 to 20 years old. Highest i.e. 305 respondents were from age group20 to 40 whereas 140 respondents were from age group 40-60 and only 67 respondents were from age group 60 and above.
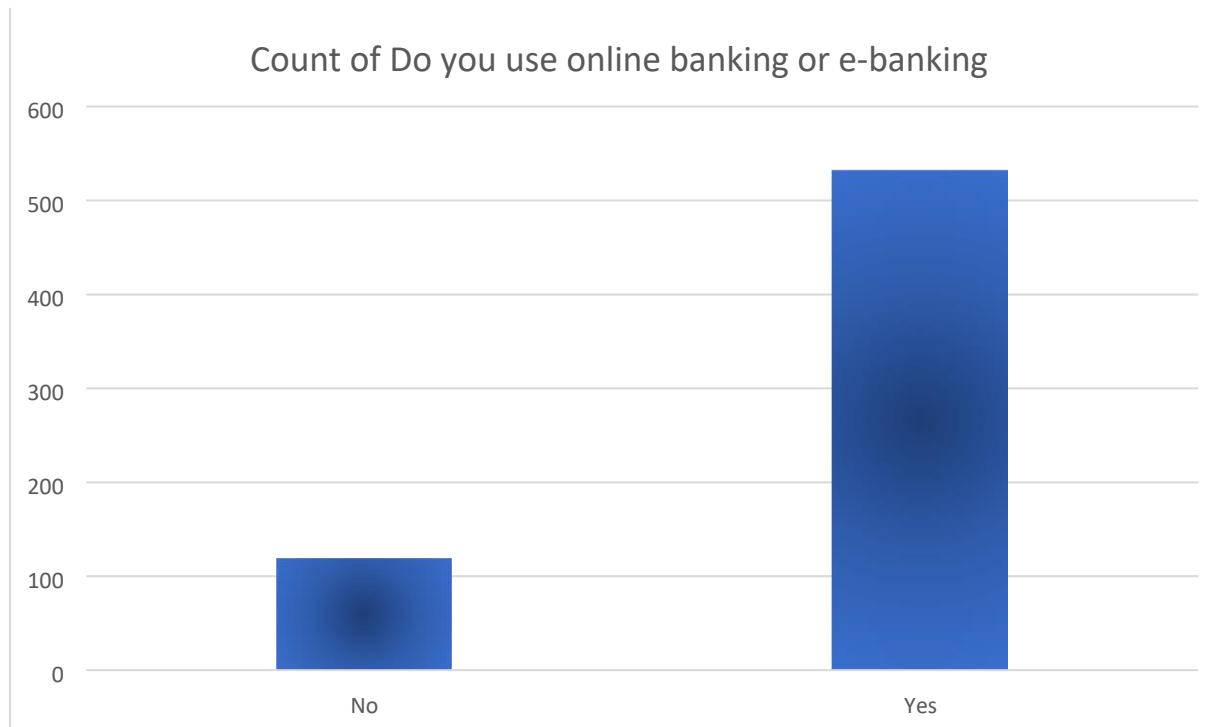
Gender of Respondents
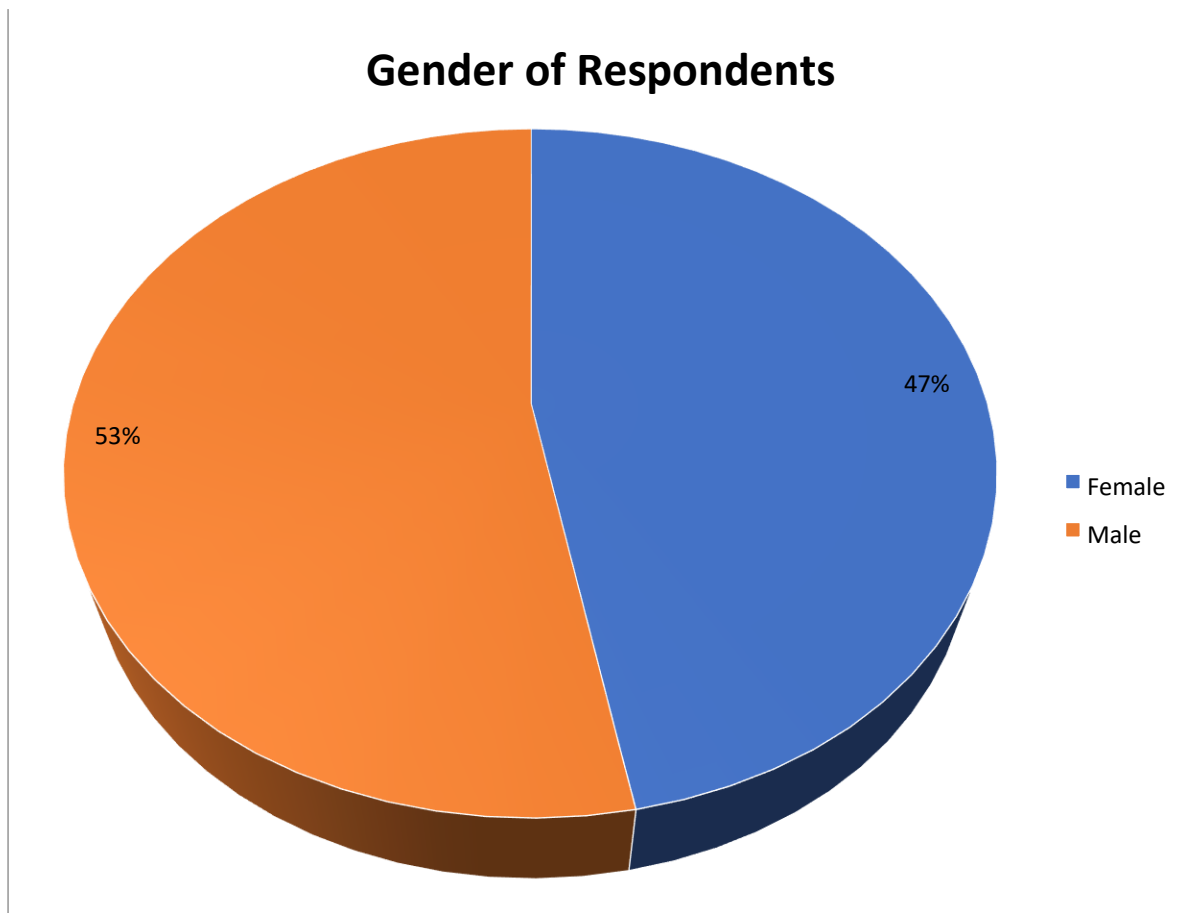
Interpretation:

Out of 650 respondents 344 were male while the remaining 306 were female. This means that overall the study is representative because as it can be seen from the above figure, the difference between 53% of male respondents and 47% of female respondents is not substantial.
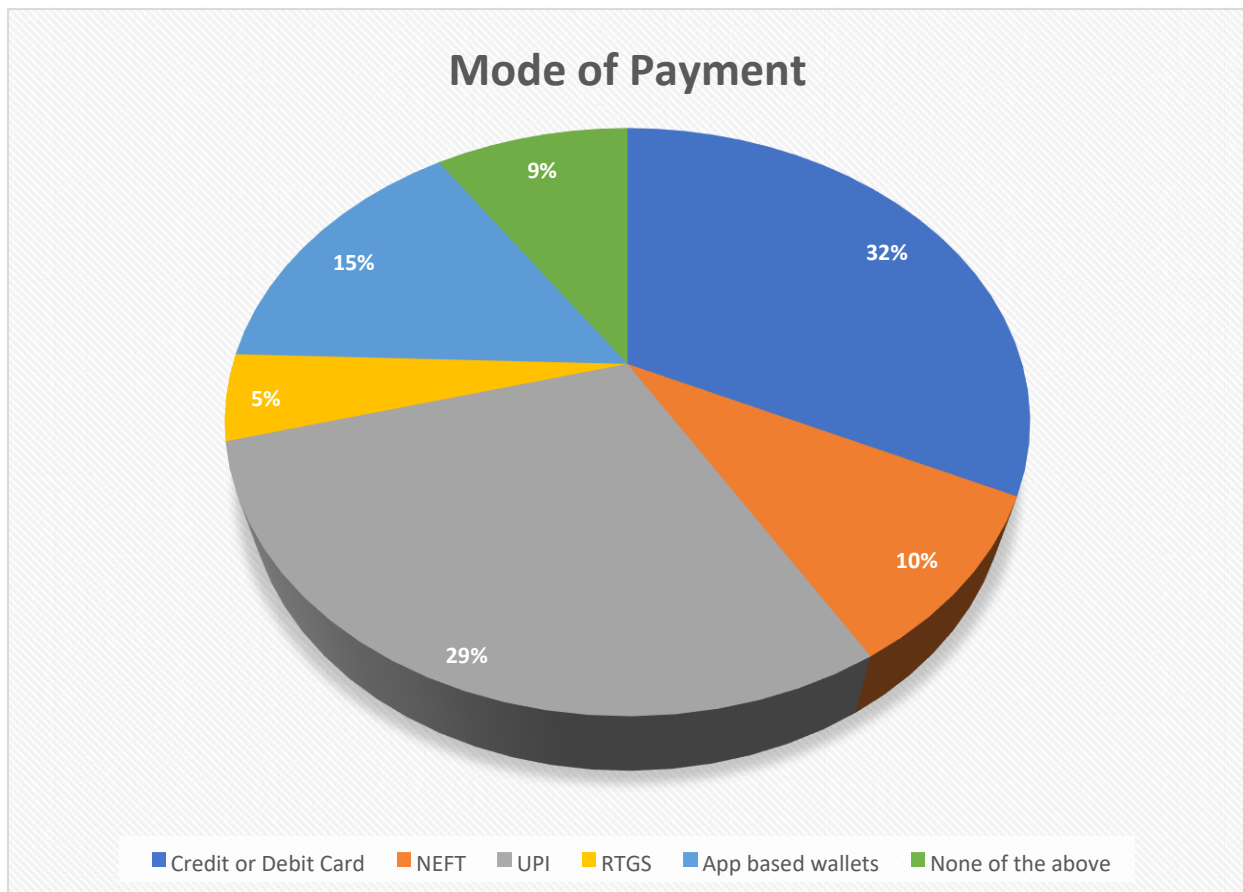
OCCUPATION OF RESPONDENTS

Legend:
- Business
- Housewife
- Other
- Retired
- Service
- Student

19%, 9%, 2%, 5%, 29%, 36%

Interpretation:

From the above pie chart, it is seen that out of 650 respondents, 36% are students, 19% are doing business, 9% are housewife, 5% are retired, 29% are doing service and 2% are belonging to other class. Hence, most of the respondents we study are students.
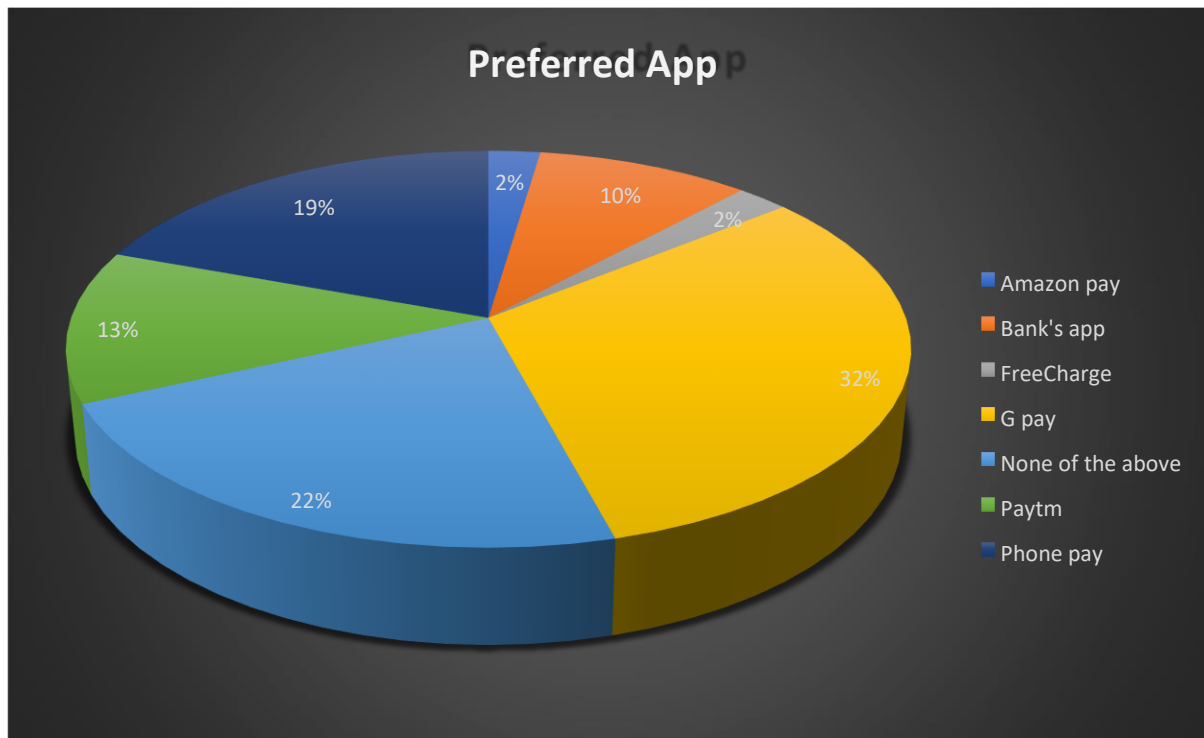
Count of Do you use online banking or e-banking

	No	Yes

(Bar chart: "No" ≈ 119, "Yes" ≈ 531; y-axis scale from 0 to 600)

Interpretation:

From the data we collected, we get to know that 531 respondents were using online banking whereas remaining 119 were not using this e-banking services. From our study, we noticed that most of the people in Pune area are aware about E-banking services and they are using this service effectively.
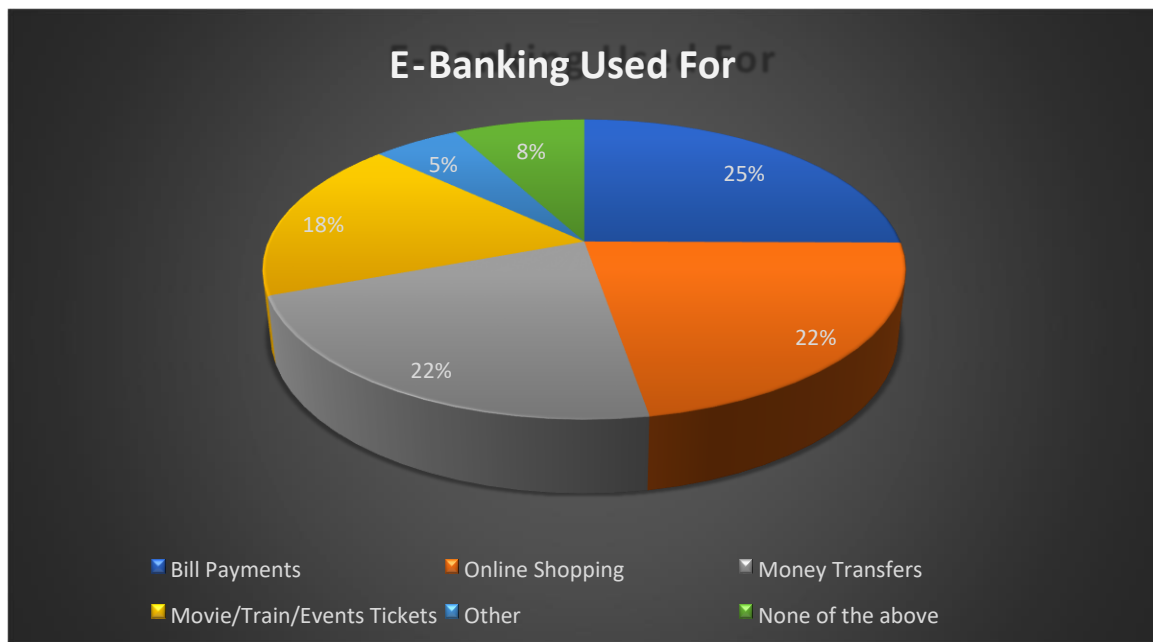
Mode of Payment

Legend: Credit or Debit Card — NEFT — UPI — RTGS — App based wallets — None of the above

Pie chart values: 32%, 10%, 29%, 5%, 15%, 9%

Interpretation:-

From the above pie chart, it is seen that the most preferred Mode of payment used for online banking is Credit or Debit card and 32% people are using it. Whereas 9% people are not using any of the mode for payment. 15% are using App based wallets, 10% are using NEFT, 29% are using UPI and only 5% people are using RTGS.

Preferred App

Legend:
- Amazon pay
- Bank's app
- FreeCharge
- G pay
- None of the above
- Paytm
- Phone pay

Chart values: 2%, 10%, 2%, 32%, 22%, 13%, 19%
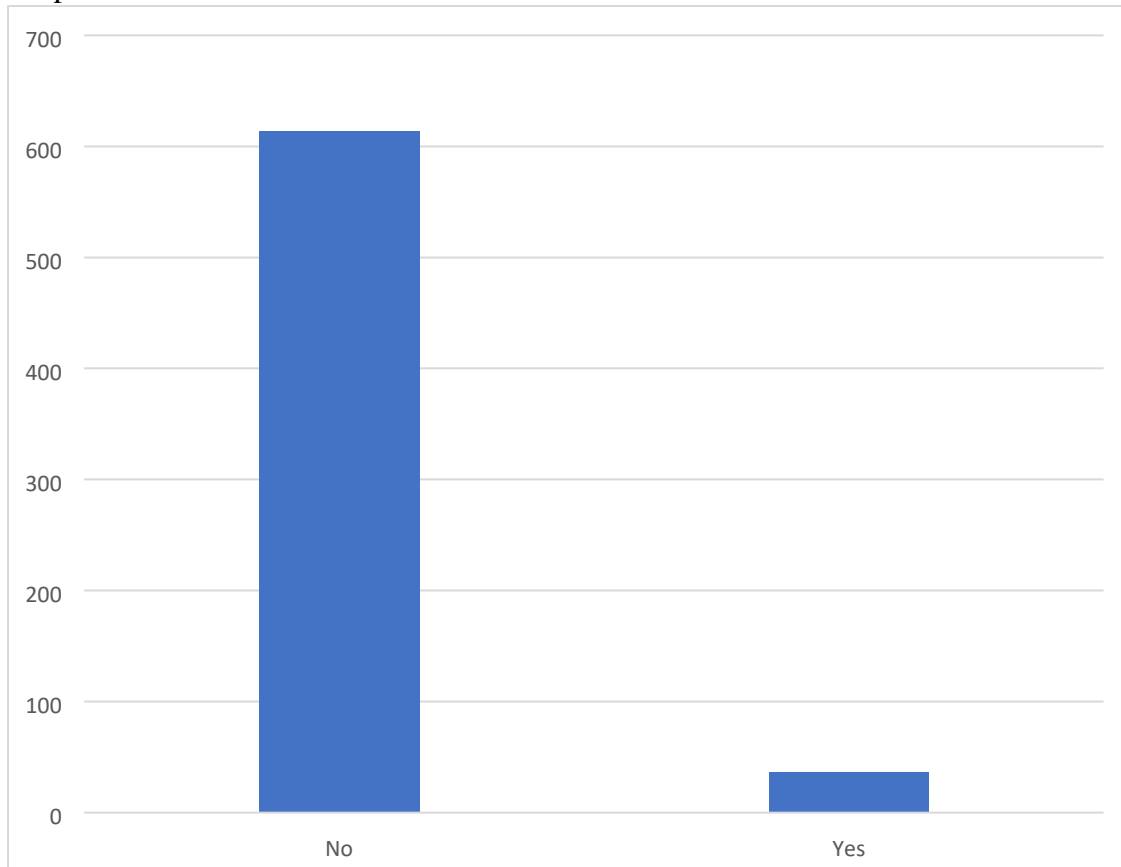
Interpretation:

From the above pie chart, it is seen that the most preferred app used for online banking is G-pay and 32% people are using it. Whereas 22% people are not using online banking. 19% are using Phone pe, 13% are using Paytm, 10% are using bank's app and only 2% people are using Amazon Pay and Free Charge.

E-Banking Used For

■ Bill Payments	■ Online Shopping	■ Money Transfers
■ Movie/Train/Events Tickets	■ Other	■ None of the above

Interpretation:

From the above pie chart, we can interpret that mostly people use online/ E Banking for bill payments (almost 25%). Online shopping as well as money transfer has same proportion (22%).
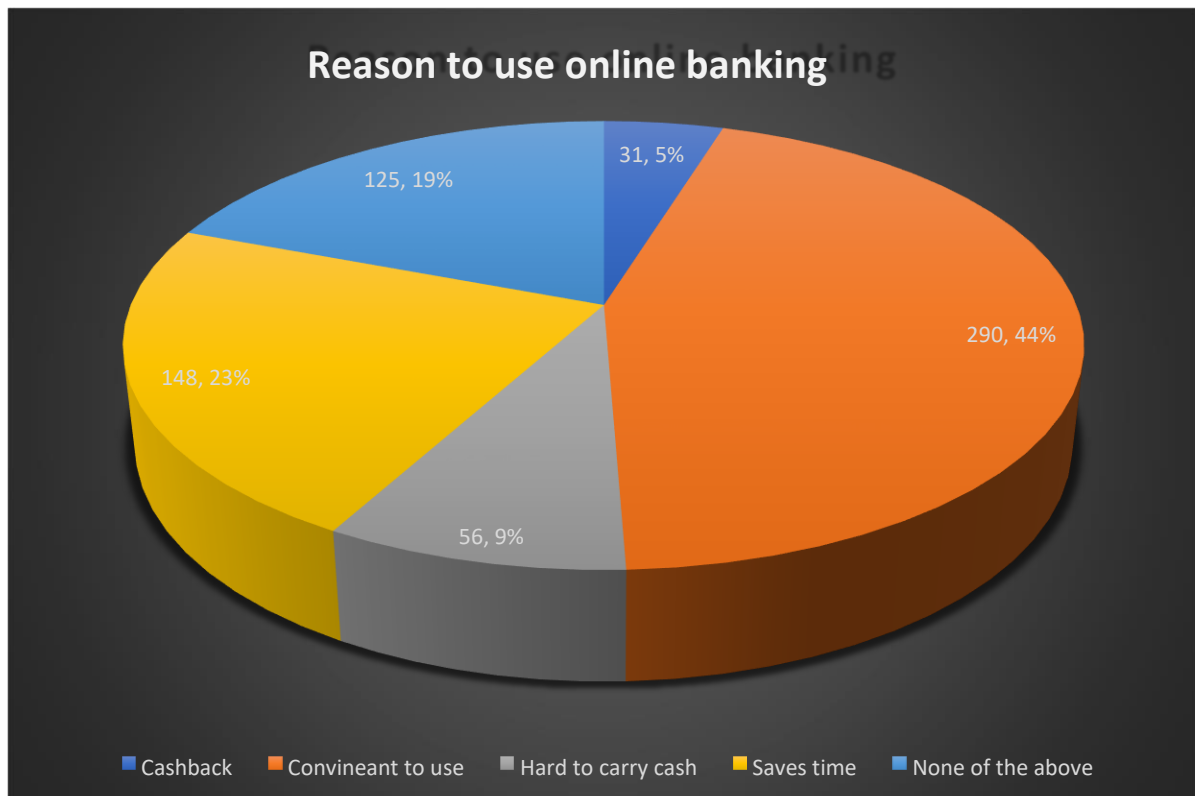
Graph of online fraud

Interpretation:

Here, we can clearly notice that number of people facing online fraud is negligible i.e. out of the data of 650 respondents we observed that only 36 people have faced online fraud whereas 614 people have never faced any kind of such frauds.

Reason to use online banking

- 31, 5% (Cashback)
- 290, 44% (Convineant to use)
- 56, 9% (Hard to carry cash)
- 148, 23% (Saves time)
- 125, 19% (None of the above)

■ Cashback ■ Convineant to use ■ Hard to carry cash ■ Saves time ■ None of the above

Interpretation:

From the above pie chart, it is seen that most of the people that is 44% people are using online banking because it is convenient to use, 23% are using because it saves time, 9% are using because they feel that it is hard to carry cash. Only 5% people are using online banking because they get cash-back after doing the transactions and 19% are not using online banking.

Online banking users before and after demonitization
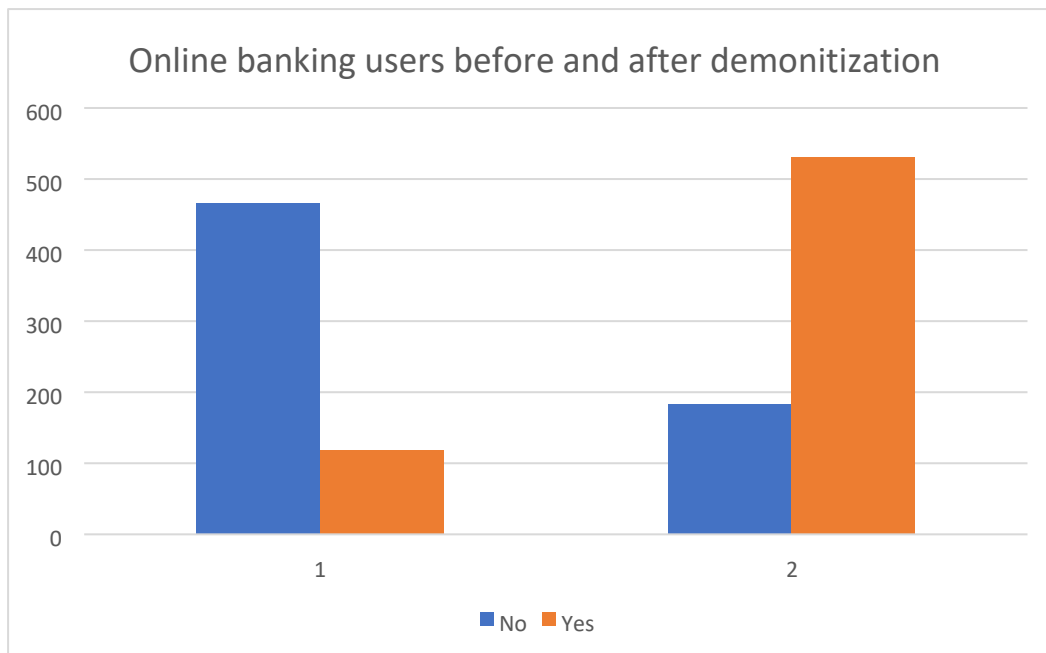
Direct comparison of people using online banking before and after demonetisation

1: Before Demonetisation
2: After Demonetisation

Interpretation:

From the above multiple bar diagram it can be seen that no of online banking users has been increased after demonetization.

TIME SERIES ANALYSIS

```
x=read.table(file="clipboard",sep="\t",header=TRUE);x

library(tseries) library(TTR)

library(forecast)

a=x$amount;a

data=c(a) data

tss=ts(data,frequency=12,start=c(2014,1))

tss plot.ts(tss)

acf(tss)

pacf(tss)

dec=decompose(tss,"multiplicative");dec

plot(dec) res=dec$random;res

plot(res)

shapiro.test(res)

adf.test(tss)

kpss.test(tss)

tss1=diff(tss);tss1

plot(tss1) z=ndiffs(tss)

z

Box.test(tss1) adf.test(tss1)

kpss.test(tss1)

c=auto.arima(tss);c

forecast(c)
```
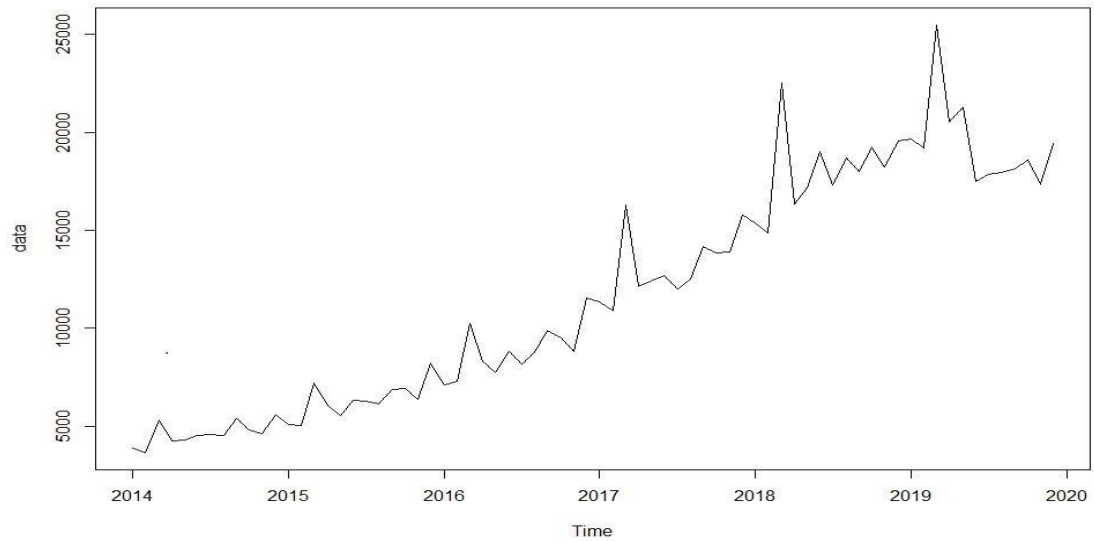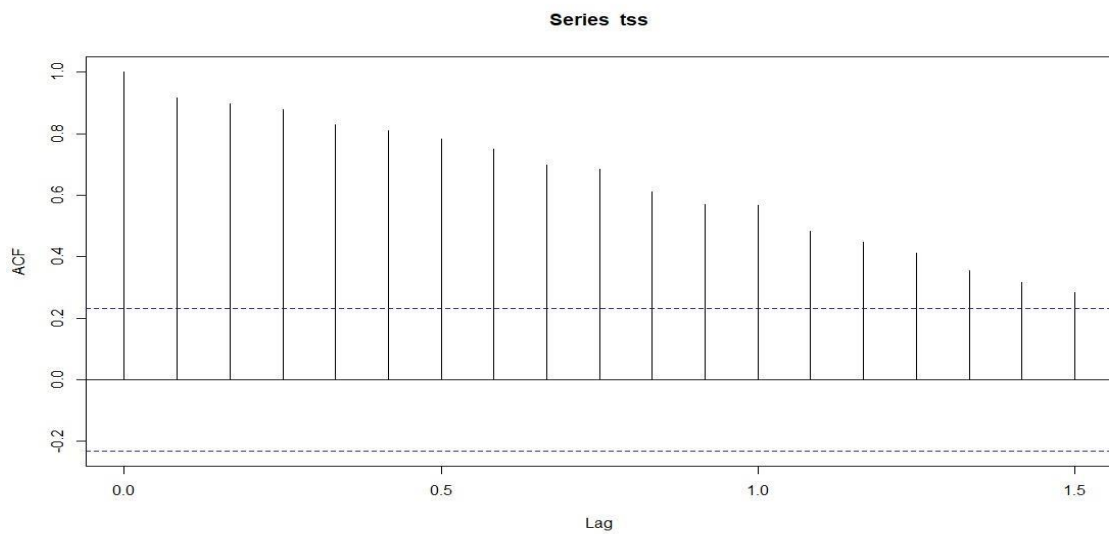
NEFT (Transaction Amount in Billions)
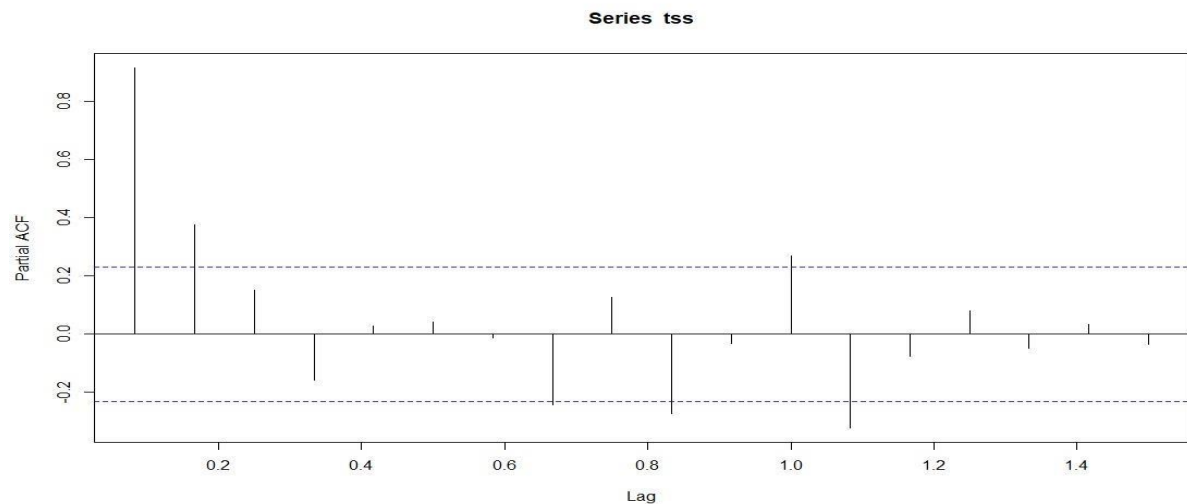
## HISTORIGRAM

Series tss

ACF Plot (NEFT Transaction Amount)

Series tss

PACF Plot (NEFT Transaction Amount)

Interpretation: The time series plot shows an increasing trend with time i.e. there is no stationarity. The above ACF is "Decaying", or decreasing, very slowly, and remains well above the significance range (blue lines). This is indicative of a non-stationary series.

Decomposition of multiplicative time series
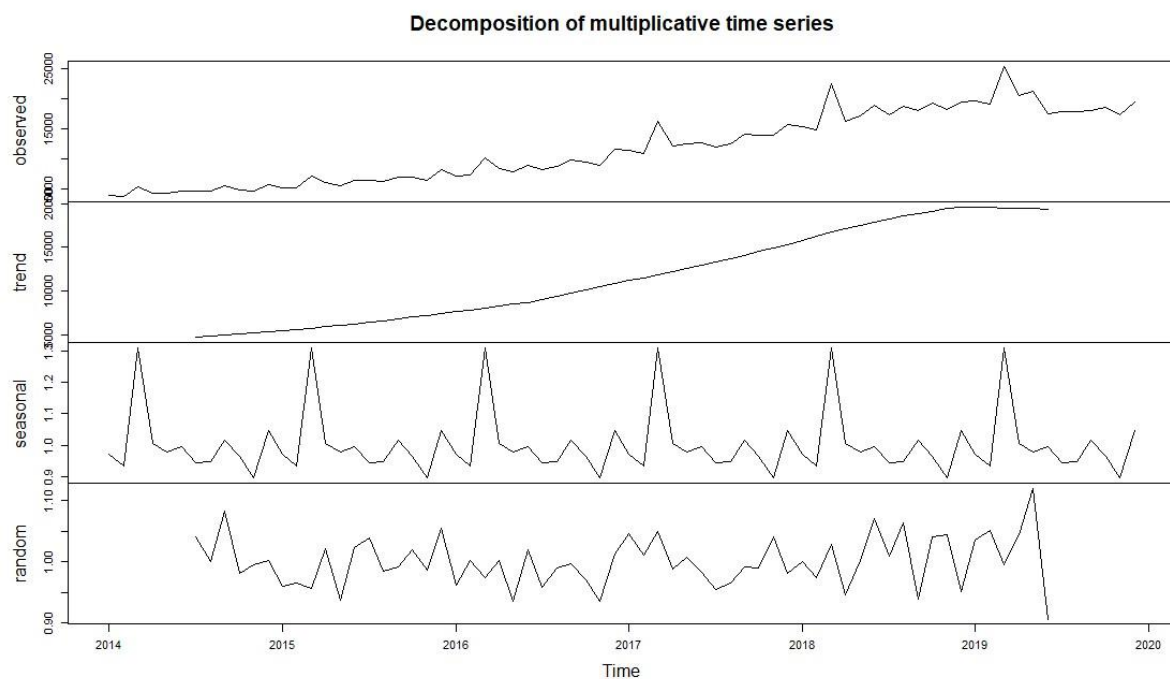
Interpretation: From this graph it can be seen that trend and seasonality both are present in the original time series data.

Tests for normality of residuals:

H_0: residuals are normally distributed

Against

H_1: residuals are not normally distributed

```
Shapiro-Wilk normality test
 data:
res
W = 0.9884, p-value = 0.8397

As p-value (0.8397) tends to 1, we may accept H0.

i.e. residuals are normally distributed.
```

TEST FOR STATIONARITY:

ADF Test:

To test H_0: Time series is not stationary Against

H_1: Time series is stationary.

Dickey-Fuller = -2.3697, Lag order = 4, p-value = 0.4248

Hence we accept H_0 i.e. the time series is not stationary.
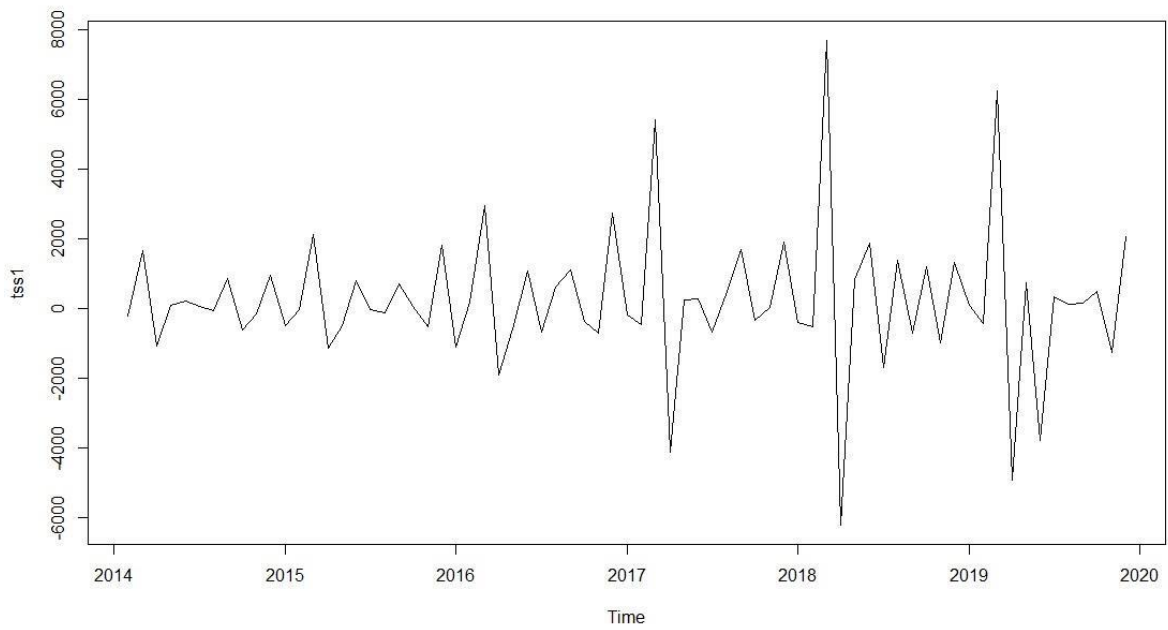
KPSS Test:

To test H_0: Time series is stationary

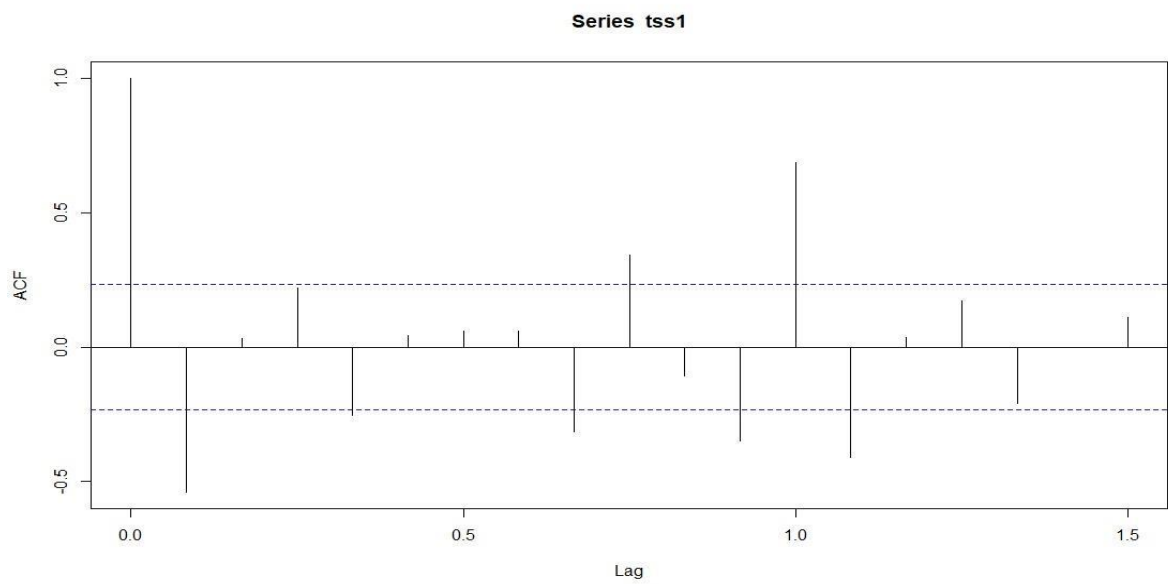Against H_1: Time series is not stationary.

KPSS Level = 1.8323, Truncation lag parameter = 3, p-value = 0.01

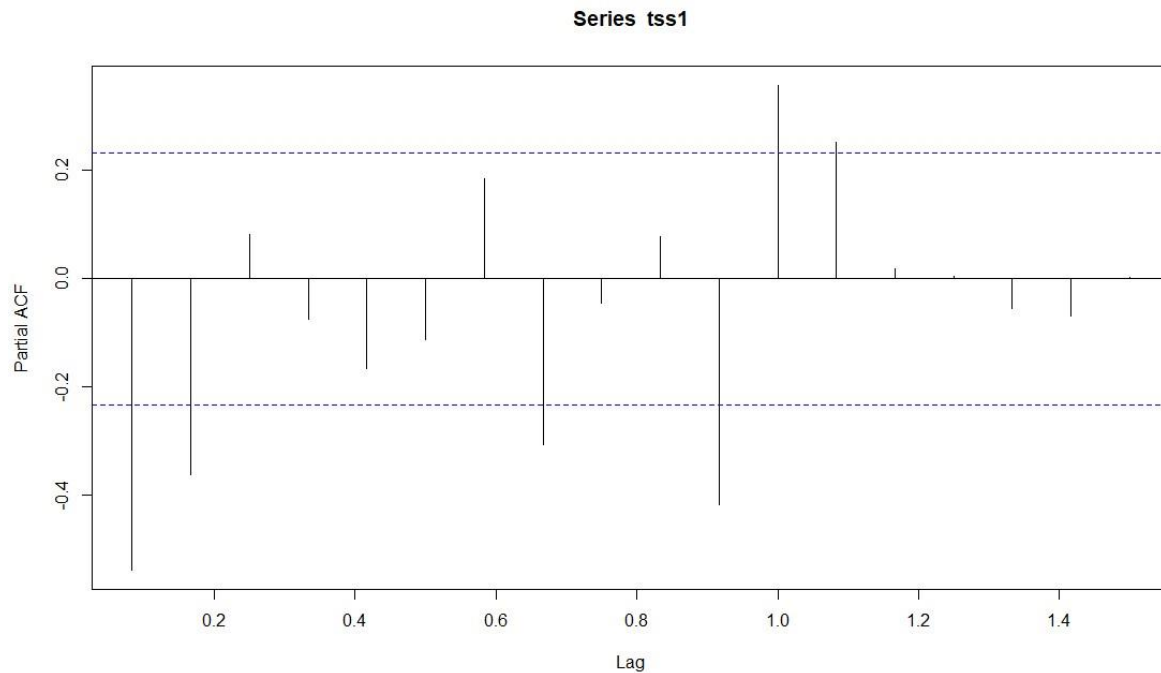Hence we reject H_0 i.e. the time series is not stationary.

Interpretation: Here from both the test we conclude that the time series is not stationary.

HISTORIGRAM (After Differencing)

Series tss1

ACF Plot (After Differencing)

PACF Plot (After Differencing)

Interpretation: We can see from the historigram that the time series is stationary. Also note that we can see an increasing variation of data after 2017.

From ACF and PACF graphs we see 90% of the spikes are lying within $\pm$ 1.96/ (N^0.5) limits. Therefore, we conclude that the Time Series is Stationary.

Note that: ACF plot shows exponential decay. This is indicative of stationary series.

Test for Stationarity:

ADF Test:

To test H_0: Time Series is not stationary Against

H_1: Time Series is stationary.

Dickey-Fuller = -4.8957, p-value = 0.01

Therefore, we reject H_0, at 5% level of significance.

KPSS Test:

To test H_0: Time Series is stationary

Against H_1: Time Series is not stationary.

KPSS Level = 0.044105, p-value = 0.1

Therefore, we accept H_0, at 5% level of significance.

Interpretation: Here, from both test, we conclude that time series is stationary after differencing.

Model fitting:

```
Series: tss
ARIMA(1,1,0)(0,1,0)[12]

Coefficients:
ar1         -
0.4985 s.e.
0.1113
sigma^2 estimated as 1140408:  log likelihood=-494.79 AIC=993.58
AICc=993.79   BIC=997.73.
```
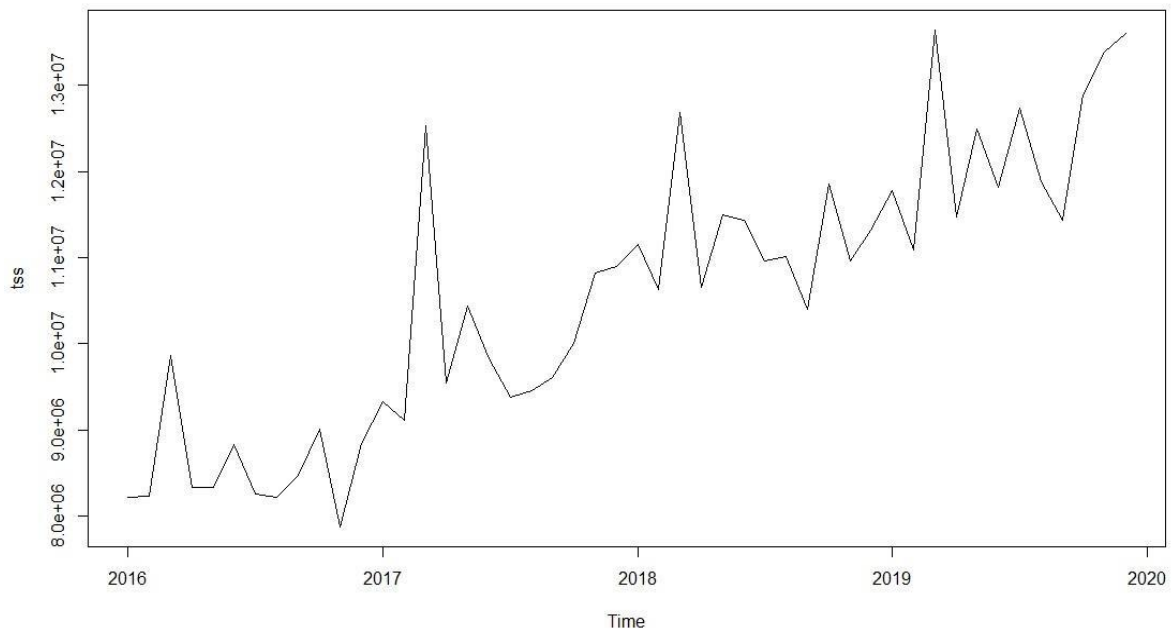
Interpretation:
From above result we can see that AIC value is less for ARIMA(1,1,0) than ARIMA(0,1,0), hence ARIMA(1,1,0) is best suitable model for this time series.

Forecasted NEFT values (in Billion Rs.) form Jan 20-Dec 21 are as follows

Point Forecast	Lo 80	Hi 80	Lo 95	Hi 95
19117.55	17502.67	20732.44	16647.80	21587.30
18792.72	17004.74	20580.71	16058.23	21527.22
25083.42	22924.06	27242.77	21780.96	28385.87
20113.01	17742.33	22483.68	16487.38	23738.64
20735.38	18121.84	23348.92	16738.32	24732.44
18974.65	16163.13	21786.16	14674.81	23274.49
18670.40	15662.21	21678.59	14069.78	23271.03
19160.55	15973.63	22347.47	14286.57	24034.53
19310.16	15951.10	22669.22	14172.91	24447.40
19849.82	16328.50	23371.15	14464.42	25235.22
18811.20	15133.99	22488.41	3187.40	24435.00
20725.32	16899.04	24551.61	14873.53	26577.12
20505.33	16167.89	24842.77	13871.79	27138.87
20136.06	15538.53	24733.59	13104.74	27167.38
26450.05	21514.84	31385.27	18902.29	33997.81
21467.43	16262.81	26672.04	13507.66	29427.20
22096.20	16612.57	27579.84	13709.72	30482.69
20332.11	14594.55	26069.68	11557.26	29106.96
20029.63	14043.11	26016.15	10874.04	29185.22
20518.85	14296.27	26741.44	11002.23	30035.48
20668.95	14217.43	27120.47	10802.20	30535.69
21208.36	14536.54	27880.18	11004.69	31412.02
20169.87	13284.36	27055.38	9639.39	30700.35
22083.92	14991.45	29176.39	11236.93	32930.91

RTGS (Transaction Amount in Billions)
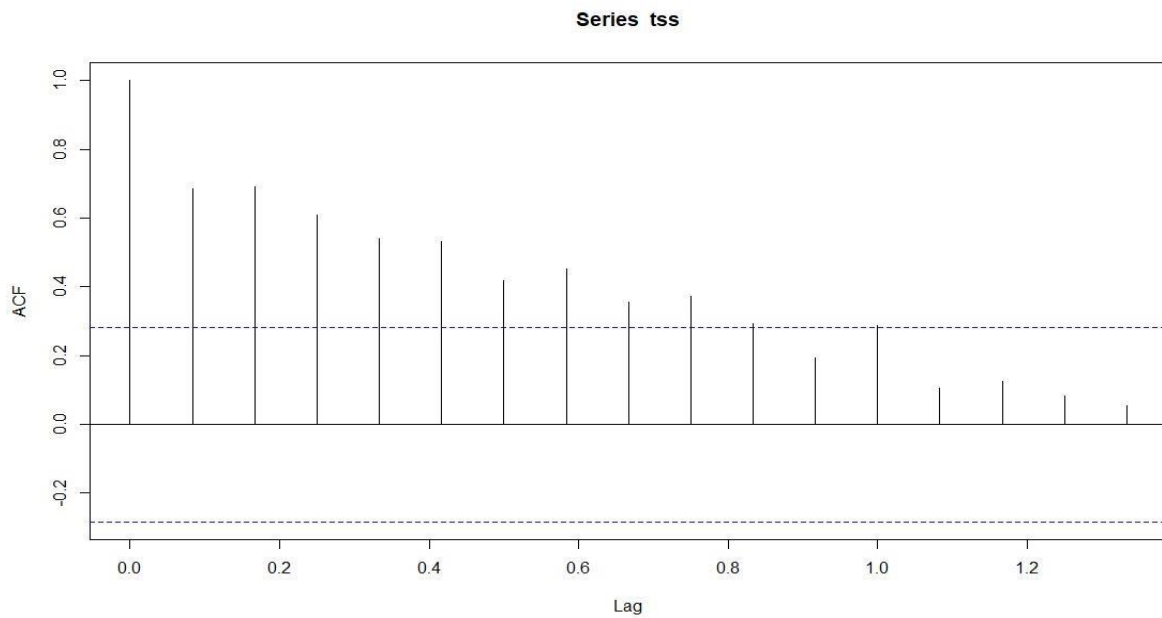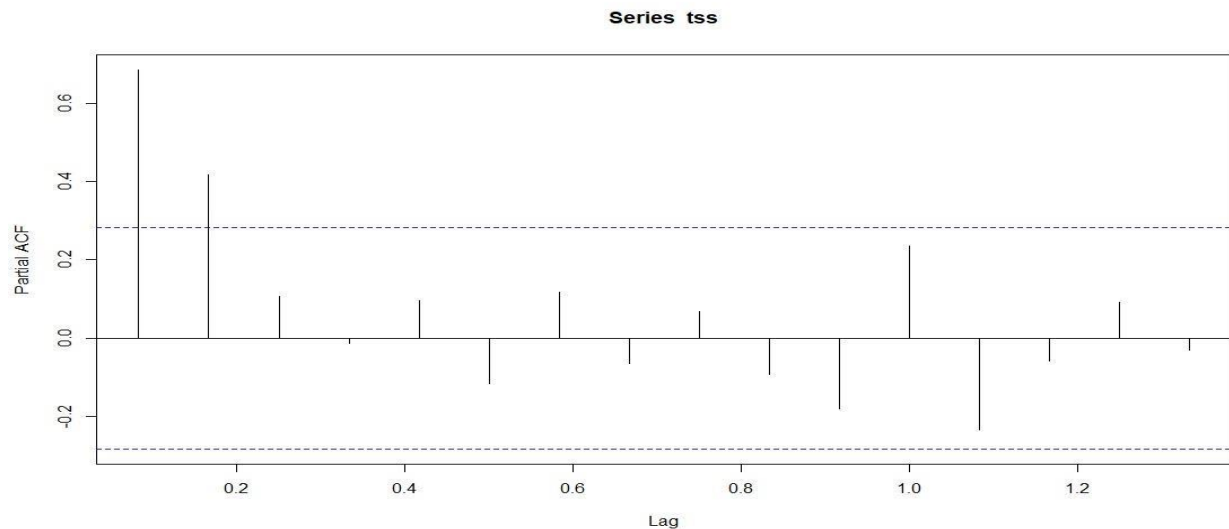
HISTORIGRAM

Series tss

ACF Plot (RTGS Transaction Amount)

Series tss

PACF Plot (RTGS Transaction Amount)

Interpretation: The time series plot shows an increasing trend with time i.e. there is no stationarity. The above ACF is "Decaying", or decreasing, very slowly, and remains well above the significance range (blue lines). This is indicative of a non-stationary series.

Decomposition of multiplicative time series
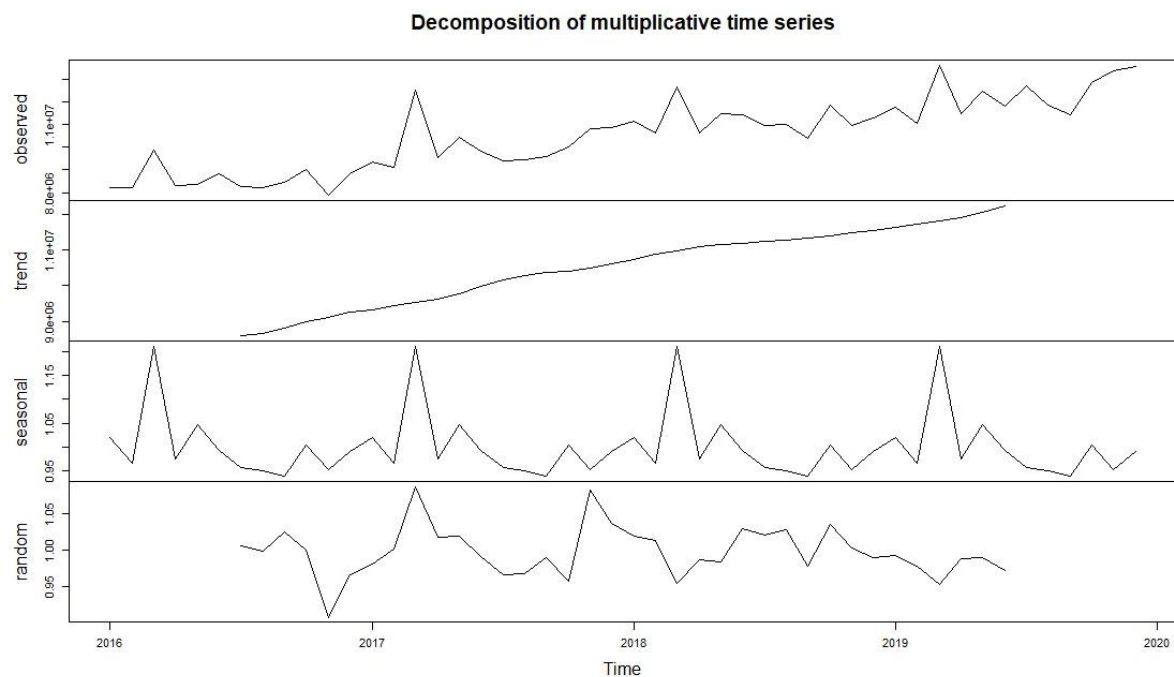
Interpretation: From this graph it can be seen that trend and seasonality both are present in the original time series data.

H_0: residuals are normally distributed

Against

H_1: residuals are not normally distributed

```
Shapiro-Wilk normality test
 data:
res
W = 0.96022, p-value = 0.2184
```

As p-value (0.2184) tends to 1, we may accept H_0.

i.e. residuals are normally distributed.

TEST FOR STATIONARITY:

ADF Test:

To test H_0: Time series is not stationary Against

H_1: Time series is stationary.

Dickey-Fuller = -3.7332, Lag order = 3.6088, p-value = 0.3193

Hence, we accept H_0 i.e. the time series is not stationary.

KPSS Test:

To test H_0: Time series is stationary

Against H_1: Time series is not stationary.

KPSS Level = 1.2141, Truncation lag parameter = 3, p-value = 0.01

Hence, we reject H_0 i.e. the time series is not stationary.
Interpretation: Here from both the test we conclude that the time series is not stationary.

HISTORIGRAM (After Differencing)

Series tss1

ACF Plot (After Differencing)

PACF Plot (After Differencing)

Interpretation: We can see from the historigram that the time series is stationary. Also, note that we can see an increasing variation of data after 2017.

From ACF and PACF graphs we see 90% of the spikes are lying within $\pm 1.96/(N^{0.5})$ limits. Therefore, we conclude that the Time Series is Stationary.

Note that: ACF plot shows exponential decay. This is indicative of stationary series.

Test for Stationarity:

ADF Test:

To test H_0: Time Series is not stationary Against

H_1: Time Series is stationary.

Dickey-Fuller = -3.9465, p-value = 0.01994

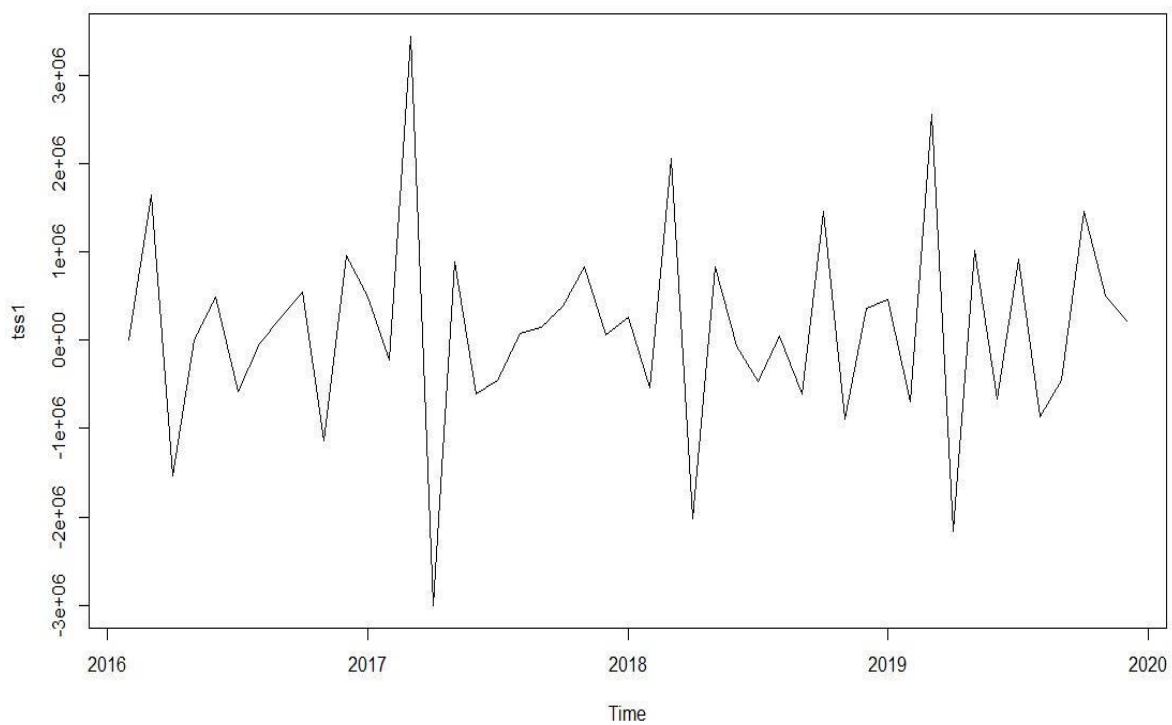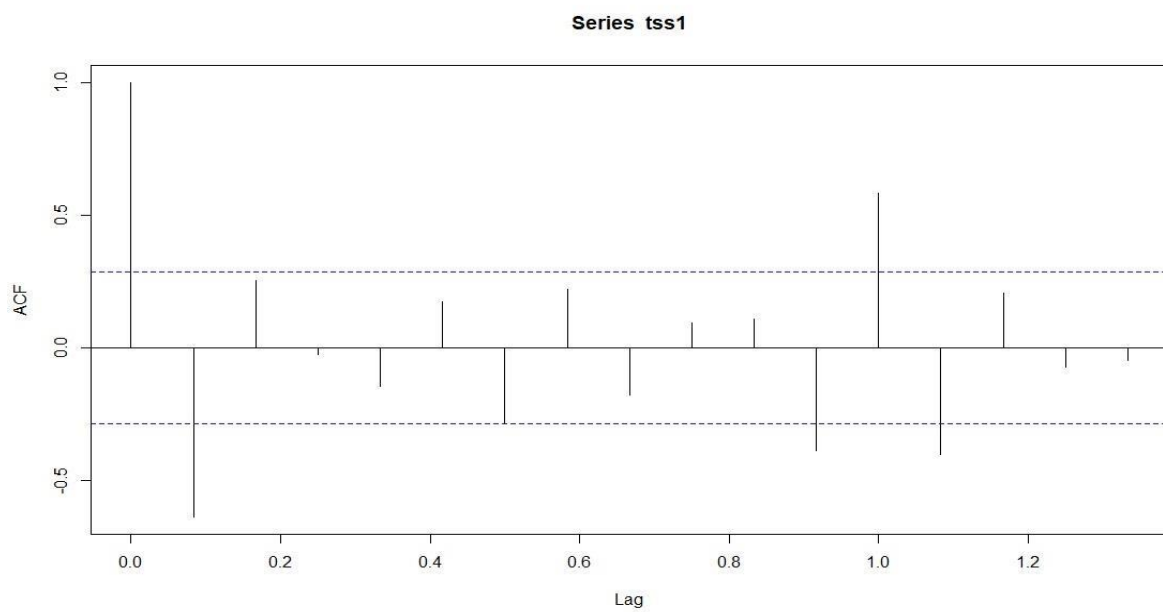Therefore, we reject H_0, at 5% level of significance.

KPSS Test:

To test H_0: Time Series is stationary

Against H_1: Time Series is not stationary.

KPSS Level = 0.044174, Truncation lag parameter = 3, p-value = 0.1

Therefore, we accept H_0, at 5% level of significance.

Interpretation: Here, from both test, we conclude that time series is stationary after differencing.

Model fitting:

```
Series: tss
ARIMA(1,1,0)(0,1,0)[12] with drift

Coefficients:
sar1      drift        -
0.7231  103750.33 s.e.
0.1106    4482.93
sigma^2 estimated as 2.35e+11:  log likelihood=-525.79
AIC=1057.57   AIC=1058.32   BIC=1062.32
```

Interpretation:

From the above result we can see that AIC value for ARIMA(1,1,0) is less than AIC value for ARIMA(0,1,0) ,so less the AIC value best is the model. So ARIMA(1,1,0) is best suited for this time series data.

Forecasted RTGS values (in Billion Rs.) form Jan 20-Dec 21 are as follows

Point Forecast	LO 80	HI 80	LO 95	HI 95
13475830	12854512	14097148	12525606	14426054
12899177	12277860	13520495	11948954	13849401
15093759	14472441	15715077	14143535	16043983
13029029	12407711	13650346	12078805	13979252
13913137	13291819	14534455	12962913	14863360
13684497	13063179	14305815	12734273	14634720
13604203	12982885	14225521	12653979	14554427
13395118	12773800	14016436	12444894	14345341
12829605	12208288	13450923	11879382	13779829
14291541	13670223	14912859	13341318	15241765
13779761	13158443	14401079	12829537	14729984
14094972	13473654	14716290	13144748	15045196
14394099	13749398	15038800	13408114	15380084
13733125	13088425	14377826	12747140	14719111
16188203	15543502	16832904	15202218	17174188
14049074	13404373	14693775	13063089	15035059
15028173	14383472	15672874	14042188	16014158
14483905	13839204	15128606	13497920	15469890
15126071	14481371	15770772	14140086	16112056
14442733	13798032	15087434	13456748	15428718
13964071	13319370	14608772	12978086	14950056
15423363	14778662	16068064	14437378	16409348
15641300	14996599	16286001	14655315	16627285
15883452	15238751	16528153	14897467	16869437

Test for Randomness of Data:

As our data is dichotomous, we are checking the randomness of the data by using one sample run test.

To test: H_0: Sample is random Against

H_1: Sample is not random.

p- value= 0.07137

As p- value tends to 1, we accept H_0.

i.e. sample is random.

Proportion Tests:

Two sample Proportion Test

Hypothesis: H_0 against H_1

H_0	H_1
1. Proportion of male (using E-Banking) before demonetization= Proportion of female (using E-Banking) before demonetization	Proportion of male(using E-Banking) before demonetization≠ Proportion of female (using E-Banking) before demonetization
2. Proportion of male (using E-Banking) after demonetization= Proportion of female (using E=Banking) after ⸮onetization	Proportion of male(using E-Banking) after demonetization≠ Proportion of female (using E- Banking after demonetization

Result:

p-value	Decision
1. 0.3717	Accept H_0 (As p- value tends to 1)
2. 0.6145	Accept H_0 (As p- value tends to 1)

One sample Proportion Test

Hypothesis: H_0 against H_1

H_0	H_1
1. Proportion of people using Gpay in Pune=0.54(Proportion of people using Gpay in India)	Proportion of people using Gpay in Pune≠0.54 (Proportion of people using Gpay in India)
2. Proportion of people using Phone pe in Pune=0.119(Proportion of people using Phone pe in India)	Proportion of people using Phone pe in Pune≠0.119(Proportion of people using Phone pe in India)
3. Proportion of people using Paytm in Pune=0.097(Proportion of people using Paytm in India)	Proportion of people using Paytm in Pune≠0.097(Proportion of people using Paytm in India)

Results:

p-value	Decision
1. 2.81×10^{-12}	Reject H_0
2. 2.2×10^{-16}	Reject H_0
3. 2.12×10^{-5}	Reject H_0

CHI SQUARED TESTS:

Test for Dependency:

1. Gender Dependency:

To Test: H_0: Gender is Independent on use of online banking

Against H_1: Gender is Dependent on use of online banking

Gender	Yes	No	Total
Male	283	60	343
Female	248	59	307

X-squared= 0.21746, Df= 1, p- value=0.641

Decision: Hence we accept H_0, i.e. Gender is Independent on use of online banking

2. Occupation Dependency:

To Test: H_0: Occupation is Independent on use of online banking

Against H_1: Occupation is Dependent on use of online banking

Occupation	Yes	No	Total
Student	203	31	234
Service	163	23	186
Business	89	34	123
Housewife	41	17	58
Retired	27	06	33
Other	08	08	16

X-squared= 31.003, Df= 5, p- value=9.35*10^(-6)

Decision: Hence we reject H_0, i.e. Occupation is dependent on use of online banking.

Age dependency:

To Test: H_0: Age is Independent on use of online banking

Against H_1: Age is Dependent on use of online banking.

Age (in years)	Yes	No	Total
00-20	113	25	138
20-40	259	46	305
40-60	110	30	140
60 and above	49	18	67

X-squared= 6.3181, Df= 3, p- value=0.09712

Decision: Hence we accept H_0, i.e. Age is independent on use of online banking

Estimation of Population Proportion using Sample Proportion

n: No of people in the sample a: No

of people using online banking

N: No of people in the population(Pune)

A: Estimate of no of people using online banking

P: Estimate of Population Proportion of people using online banking

Q = 1-P

SE: Estimate of standard error of the estimate of population proportion of people using online

banking n = 650 a = 513 N = 7126400 p = a/n

  = 513/650

= 0.7892 q

= 1-p

 = 0.2108

P = E(p) = 0.7892

A = N*P

  = 7126400*0.7892

  = 5624154.88

SE (P) = ((p*q)^0.5)/n

    = 0.0002881

Conclusion: We can estimate that 79 percent of the population is using online banking i.e. close to 56 lakhs of Pune's population with a standard error of 0.0002881

INTERPRETATION OF ANALYSIS

From the sample which we obtained, to check whether the sample was really random or not, we performed one sample run test and from that it can be interpreted that we accepted the null hypothesis i.e. the sample is random.

From our Exploratory Data Analysis and Confirmatory Data Analysis we would interpret that,

1. Proportion of people using online banking in Pune is more than proportion of people using online banking in India. This is because Pune is an urban city while India is a developing country which includes both urban places as well as rural places.
2. Proportion tests for testing the proportion of people using various applications
   (G pay, Phone pe, Paytm) for our sample by comparing it with proportion of people using these applications throughout India (which we got from website) gave us a result of rejecting null hypothesis. Which tells us that proportion of people using these applications in Pune is not same as that of India.
3. Chi- squared tests were used to check dependency of age, gender, occupation on the use of online banking. From the results obtained we can interpret that age as well as gender is independent of the use of online banking while occupation is dependent on the use of online banking.

From Time Series Analysis we can forecast the transaction amount that will be transacted in next 24 months. First we checked whether the time series data was stationary or not, if not then we made it stationary and we fitted a model for our data following which we forecasted the transaction amounts for NEFT and RTGS for each month in 2020 and 2021.

From estimation of population proportion on the basis of sample proportion we could estimate that about 79% of total Pune's population uses online banking.

CONCLUSION

From our primary as well as secondary data, we would like to conclude that,

1. Pune being an urban city, people in Pune city mostly prefer to use online/EBanking as compared to India.
2. Proportion of male and female using online banking/E-Banking has been increased after demonetization.
3. Proportion of people using different applications (like GPay, Phone pe, Paytm) is not equal to that of India.
4. Many people in Pune prefer to use GPay than Phone pe or Paytm or other applications.
5. There is no gender dependency or age dependency on the use of online banking.
6. Occupation depends on the use of online banking. Students (the youth) of Pune are the ones who mostly prefer to use online banking/E-Banking.
7. From exploratory data, analysis of occupation we can conclude that only 5% of retired people use online banking but this conclusion can be helpful for banking sector to encourage 60 and above age group people to use mobile banking.
8. When digitalization system came into picture, there has been an increase in the transactions carried out by NEFT and RTGS resulting in the increasing trend of amount transacted each month. From this secondary data we forecasted the amount that should be transacted in next 24 months for each month and it has been seen that there is an increasing trend.
9. We can conclude that 79% of Pune's population is using online banking i.e. close to 56 lakhs of Pune's population.

SCOPE AND LIMITATIONS

1. We can access our account whenever and wherever we want. We do not actually have to go to the bank to withdraw or to deposit the money.
2. Payments can be done within fraction of seconds without consuming much time.
3. We can get to know about any fraudulent activity to our account before it can pose severe damage.
4. It is the most convenient mode of money transfer.
5. We can easily know about our past transactions and it can help us manage our money efficiently.
6. In coming years, online banking will not be only acceptable mode of banking but will be most preferred mode of banking in India.

1. **Security and privacy risk**: A large no of people refuse to adapt online banking facility due to securities privacy risk.
2. **Consumer awareness**: In India people do not use E-Banking due to lower awareness.
3. Due to lack of internet facilities in remote areas people are oblivious to online banking.
4. E-banking the main challenge in infrastructure risk.
5. Challenge to E-banking through social and cultural barriers.

QUESTIONNAIRE

1. Age
- 00-20 years
- 20-40 years
- 40-60 years
- 60 and above

2. Gender

- MALE
- FEMALE

3. Occupation

- Student
- Service
- Housewife
- Retired
- Business
- Other

4. Pincode (area you live currently)

5. Do you use online banking or e-banking?

- YES
- NO

6. Which mode of digital banking do you prefer other than cash?

- Credit/Debit Card
- NEFT
- RTGS
- App Based Wallets
- None of the above

7. If you are using online banking, then which app do you prefer?

- Paytm
- FreeCharge ☐ Google Pay
- Phone Pe
- Amazon Pay
- Banks App
- None of the above

8. For which purpose do you use online banking?

- Bill payments (all types of bills)
- Online shopping
- Money transfers
- Movie/Trains/Events Tickets
- Other
- None of the above

9. Have you ever faced online frauds?

- Yes
- No

10. Yes, how many times?

11. Why do you prefer online banking instead of cash payments?

- Cash back
- To save time
- Convenient to use
- Or it's just hard to carry cash
- None of the above

12. Have you ever used online banking before Demonetization?

- Yes
- No

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