

# ANALYSIS OF NEFT TRANSACTIONS OF INDIAN BANKS (2009-2016)



भारतीय प्रबंध संस्थान बेंगलूर  
INDIAN INSTITUTE OF MANAGEMENT  
BANGALORE

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course in GMITE-10 programme taught by  
**Prof. Dr. Shankar Venkatagiri**

Prepared By:  
**Kartik Srinivasan (GMITE10130)**  
**Nilesh Agarwal (GMITE10142)**  
**Surabhi Sharma (GMITE10165)**  
**Yash Londhe (GMITE10171)**

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## Introduction

The central bank of any country drives the development of the country's payment systems. The Reserve Bank of India as the central bank of India has been playing this developmental role and has taken several initiatives for building faster, safe, secure and reliable payment systems in the country.

As the volume of cheques in the banking system in a huge country like India was adding a lot of pressure and unpredictability in clearing transactions, the RBI, since the late eighties and nineties has been diligently working to put together numerous technology-based solutions and products for improving the payment and settlement systems in India.

In November 2005, RBI introduced an electronic system which facilitated one-to-one funds transfer requirements of individuals / corporates. The NEFT system as it is called, provides for batch settlements at hourly intervals, enabling near real-time transfer of funds.

Understanding that India is a country where a significant proportion (70%-95% based on various estimates) of all transactions are done in cash, we attempt to analyze the data around NEFT transactions that RBI has made publically available to draw inferences about the adoption of electronic transactions across various Banks in India across the Public, Private, Foreign and Co-Operative categories.

We intend to seek answers to questions like

- How are NEFT transactions growing year-on-year in India?
- How much (in value) on an average, do we transact on NEFTs
- Banks of which sector fuel this growth?
- What are the growth characteristics?
- Are there seasonal patterns in the value / volume of NEFT transactions
- Can we expect the recent De-monetization measures increase the adoption of NEFT transactions in India?

## About the Data

### Source

The data is a list of NEFT (National Electronic Fund Transfers) transactions that was recorded by RBI in from January 2009 to October 2016. The raw data (month by month from Jan 2009 to October 2016) was collected from the RBI website (<https://www.rbi.org.in/Scripts/NEFTView.aspx>). The monthly data was downloaded and then collated into 8 files based on year (2009.xlsx to 2016.xlsx).

### Schema

The schema of the monthly dataset provided by RBI is

Field	Description
Name of the Bank	The Bank Name
Outward Number of Transactions	The Number of NEFT Transactions that originate from the bank
Outward Value of Transactions (Millions)	The value of NEFT Transactions that originate from the bank
Inward Number of Transactions	The Number of NEFT Transactions that get credited to accounts in from the bank
Inward Value of Transactions (Millions)	The value of NEFT Transactions transacted towards credits into accounts of the bank

- Two new columns were introduced in the data set namely, Month and Year to capture the interval variables.
- Another data file “Classification.xls” was prepared with contains the “sector” mapping of the Bank viz.

Sector	Code
Public	PSB
Private	PVT
Foreign	FOR
Co-operative	CO-OP
Other Financial Institutions	FI

This was done to introduce a nominal (categorical) variable on which we will be used in some of our analysis

- Using the data as structured above, a preprocessing was done on the data to convert it into the desired format.  
Data consolidation and Pre-processing is done in R (“NeftData.R”), which does the following:
  1. Reads the raw data files year by year
  2. Enhances the dataset by adding 3 new fields
    - a. **MonthAndYear** – Combination of Month And Year separated by space. Example: Jan 2009, July 2012, etc. (Interval variables)
    - b. **TotalTxns** – Sum of the inbound number of transactions and outbound number of transactions
    - c. **TotalTxnValue** – Sum of the inbound value of transactions and outbound value of transactions.
  3. Creates a new column “**Sector**” by taking the join (merge in R parlance) of the above modified dataset and the sector data in the “Classification.xls” file.
  4. This enhanced dataset is represented as “**neftDataMerged**”

## Challenges

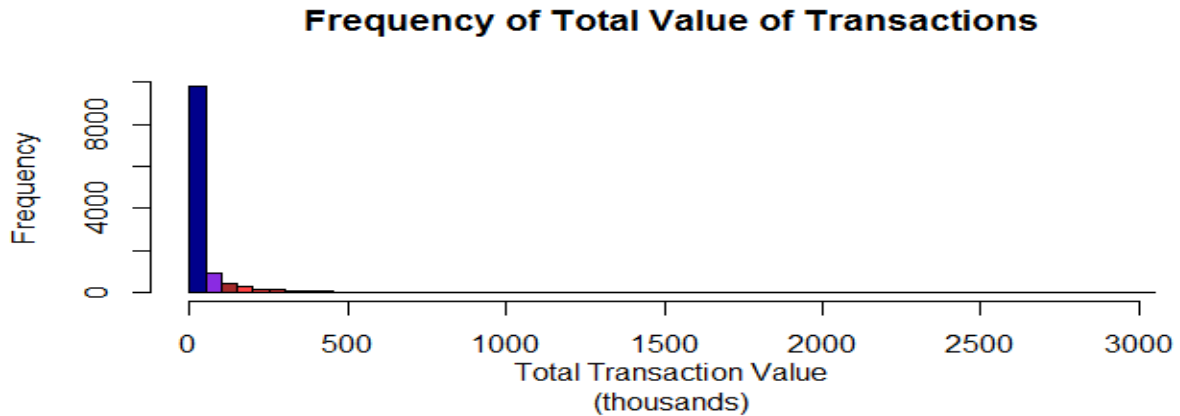
Numerous problems were encountered during the data collection and cleansing process. Some of the key challenges we faced are enumerated below.

1. Incomplete/Missing data – Data for some months missing (particularly November 2016, which was to be used to analyze the impact of demonetization on the NEFT transactions)
2. Units of data were inconsistent (some data was in million, others in crores). We decided to use millions as our units for value of transactions
3. Bank Names were inconsistent. Same banks were represented in different names across months/years.
4. RBI publishes the NEFT data monthly and in a proprietary format - data had to be downloaded for each month, standardized and collated together month by month.
5. In order to make sense of the data, additional nominal variables (Sector) had to be attached to the raw monthly dataset provided. As no out-of-the-box dataset for this was available, we had to dig up bank information to arrive at this classification.

## Data Analysis

### Frequency Distributions

#### Total Value of Transactions



Graph 1 :Frequency of Total Value of Transactions

The above graph shows the frequency distribution of the total value of transactions per year. It is clear that a large number of transactions are carried less than the transaction value of Rs.500,000.

### Measures of Central Tendency and Dispersion

#### Number of Transaction Per Year

Year	Min.	1st Quartile	Median	Mean	3rd Quartile	Max.	SD
2009	0.07	104.4	773.7	5367	4218	87450	252227.4
2010	0.02	144.2	1472	12180	8972	278500	475435.7
2011	0.2	300.9	3756	25130	21290	515300	802637.7
2012	0	275.8	2818	36560	32580	771700	1276600
2013	0	300.3	1457	45770	37730	1277000	2002122
2014	0	461.7	1767	58530	44230	1735000	2886055
2015	0	604.1	2417	77300	54410	2314000	3908475
2016	0	866.3	3177	99600	56200	3002000	4313386

Illustration 1: Number of Transactions per year

Above table (Illustration 1) shows the summary measures of the data year wise. We notice that the variation (Standard Deviation - SD) in the data is increasing year on year. This could indicate that NEFT is increasingly being used for a variety of monetary transactions (small and large).

#### Average Transaction Value Per Year

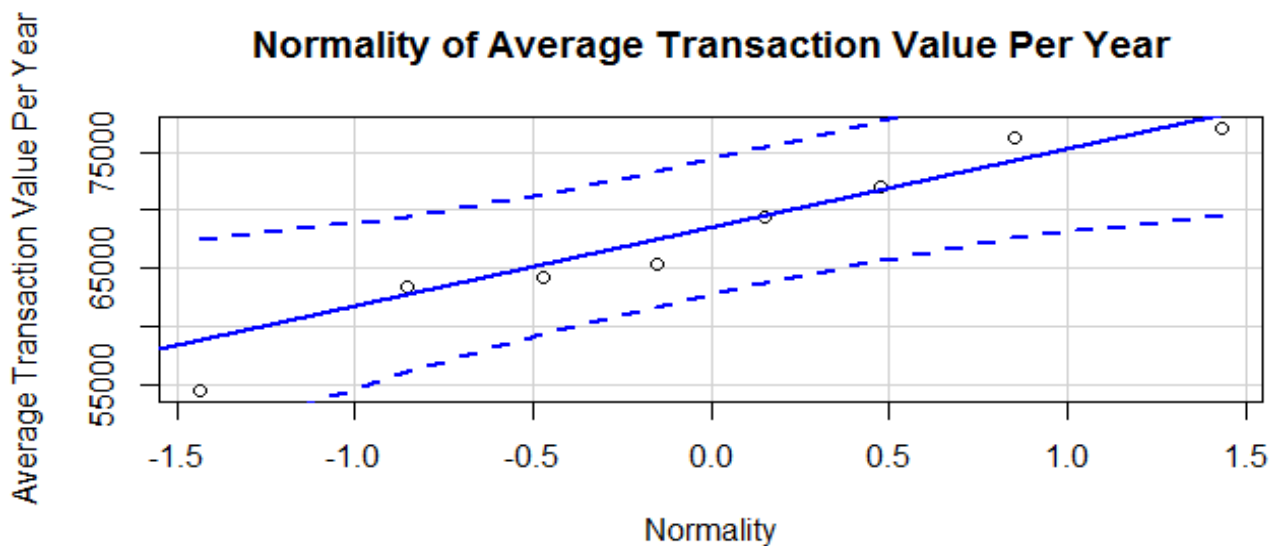
The summary measures for the average value of transactions

Min.	1st Quartile	Median	Mean	3rd Quartile	Max.	SD	Skewness
54470	63980	67380	67760	73040	77080	7493.371	-0.36151

Illustration 2: Normality of Average Value of Transactions per year

Supported by the table of summary measures, we note that the skewness measure (negative but close to zero) conveys that the values could be normally distributed.

We further tested the normality further using a QQ Plot in R that indicates normality.

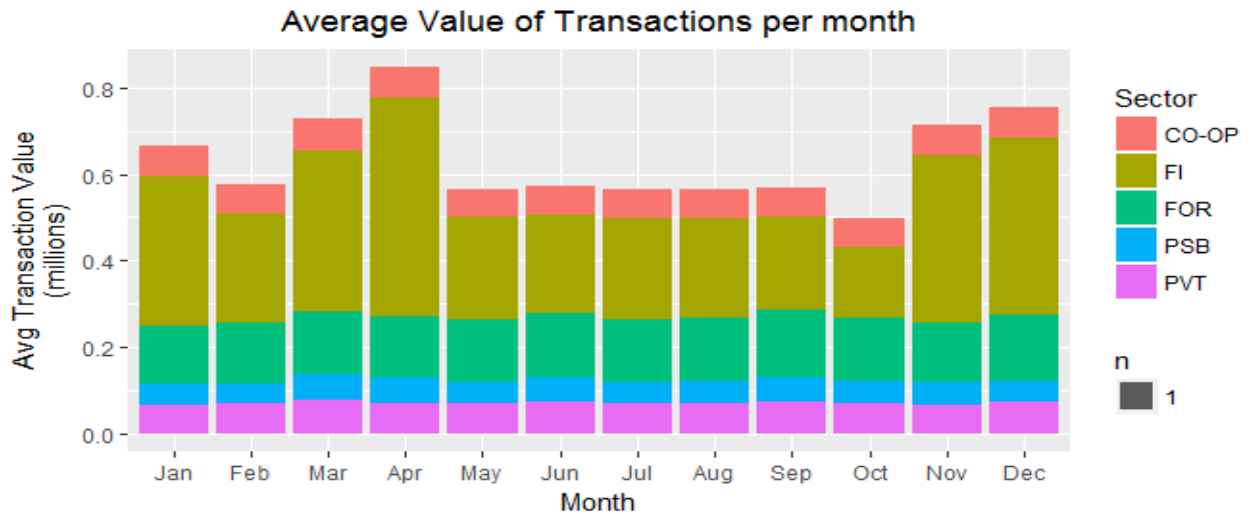


Graph 2: Normality of Average Value of Transactions per year

As indicated by the QQ plot test for normality, we can conclude that the distribution of average transaction values per year is normal.

## Trends and Insights

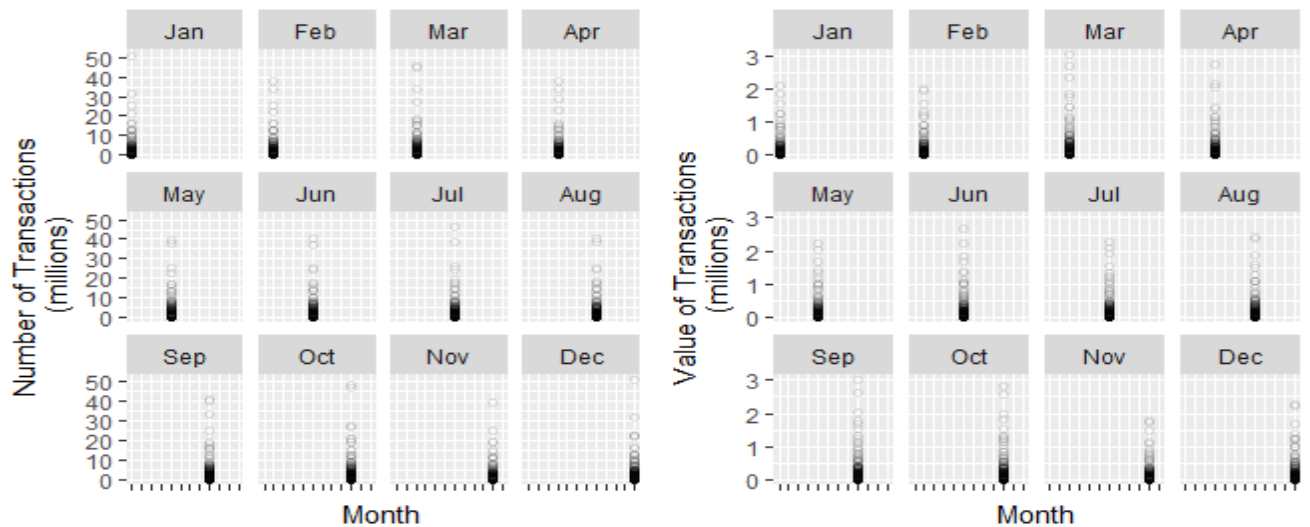
### Average Transaction Value Per Month



Graph 3: Bar-Graph of the Average Value of Transactions month-wise and then arranged as per the Bank Sector

The above graph shows the trend for the average value of transactions taking place per month for each of the bank sectors. We see that the Financial Institutions (e.g. Clearing Corporation Of India etc.) show the most variation in the total value contribution. Otherwise, the value of transactions has remained pretty consistent Month-on-Month across other sectors.

### Month-wise analysis - by volume and value



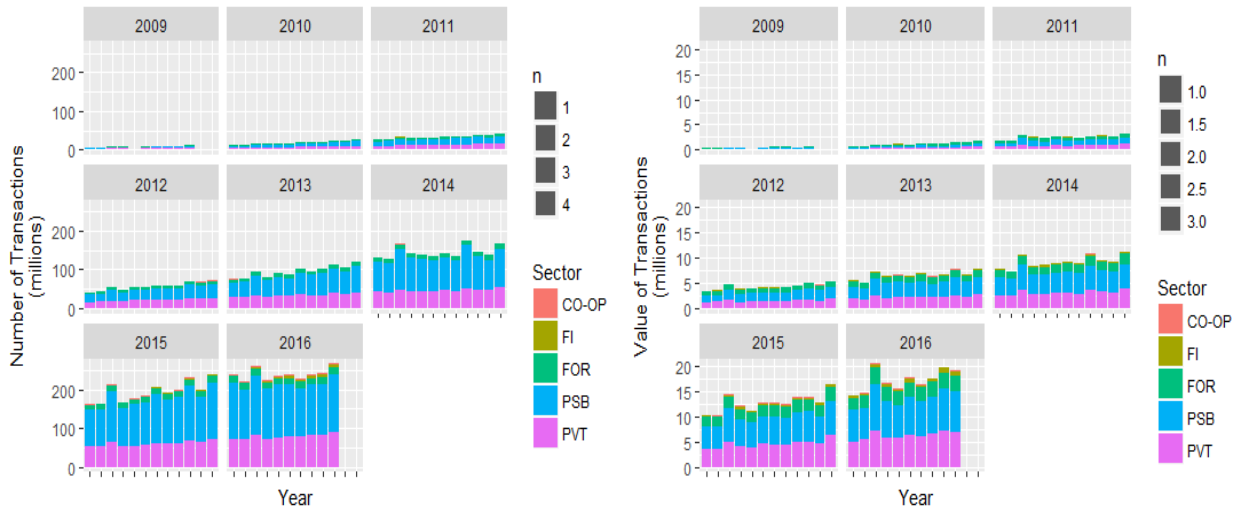
Graph 4: Plot of Total Number of Transactions/Total Value of Transactions by each month



The scatter plot shows an interesting pattern of peaks in the months of March, October through December. This is seen for both the number of transactions and the total value.

## Sector-wise Analysis

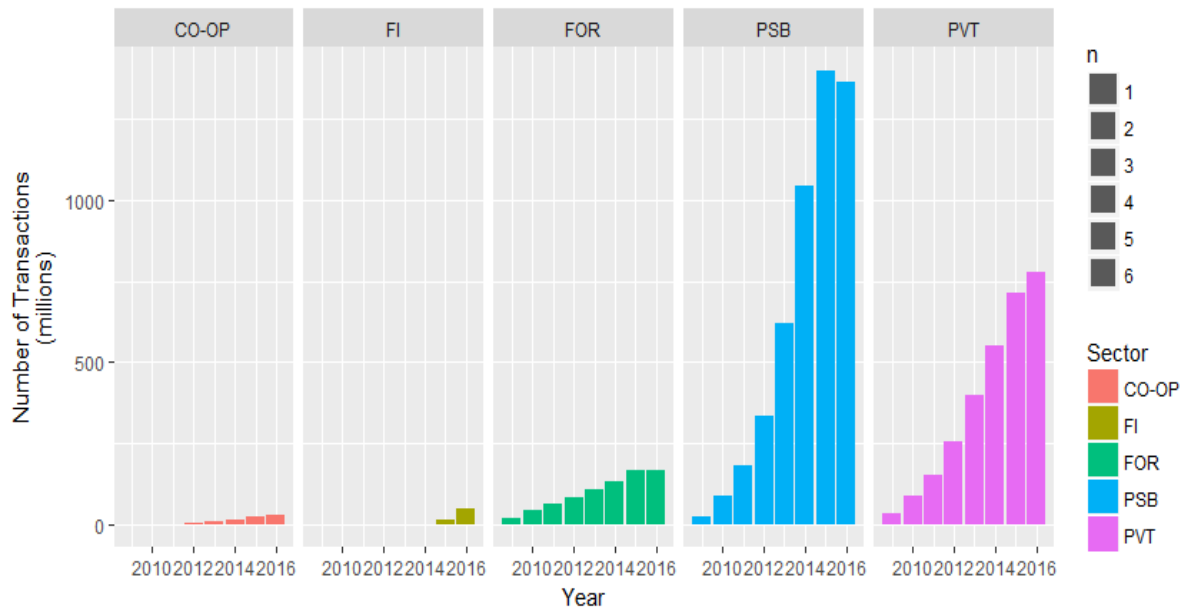
### Annual Volume and Value of Transactions



Graph 5 : Sector-wise – Annual No. of Transactions/Value of Transactions month wise Bank Sector

From Graph 5, we can clearly see that the rate of growth for 2015 and 2016 is significantly steeper than the prior years. It also shows that the bulk of this growth is comes

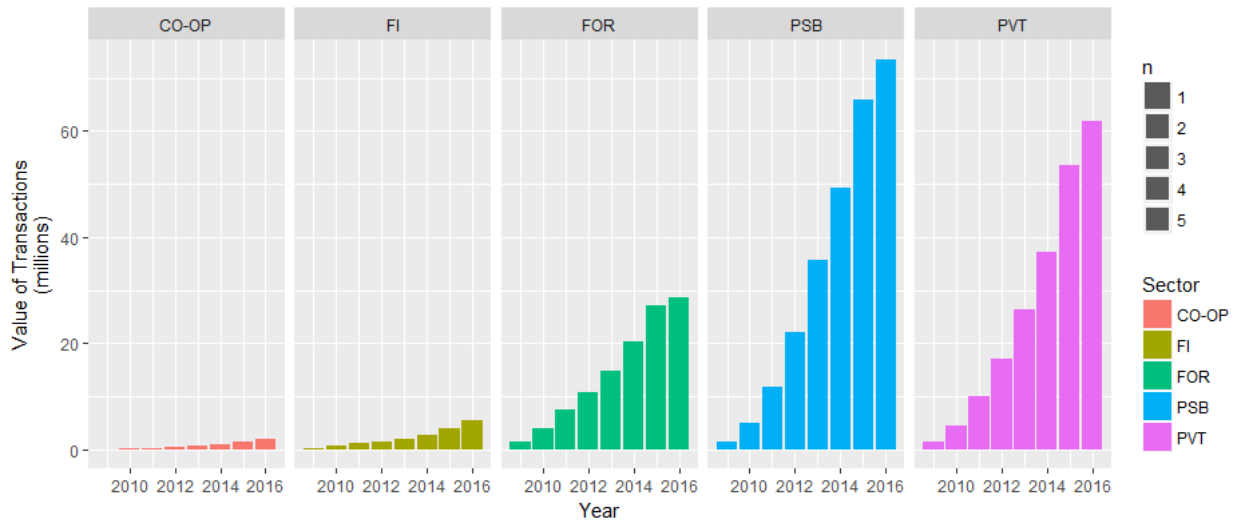
### Annual Volume of Transactions – In-Sector Trends



Graph 6: Total Number of Transactions year-wise grouped by the Bank Sector

From Graph 6, we can clearly see that the rate of growth in the total number of transactions for public sector banks is significantly steeper than the other sectors. Co-operative banks see the least traction in adoption of NEFTs.

#### *Annual Value of Transactions – In-Sector Trends*



Graph 7 : Total Value of Transactions year-wise grouped by the Bank Sector

In Graph 7, we can clearly see that the growth in the value of transactions year on year has grown significantly for Private and Public sector banks.

## Conclusions

### Growth Trends

- NEFT transactions in India are showing significant growth year-on-year.
- From 2009-2014 we see a good growth trend Y-o-Y. However, the growth trends over the last couple of years (2015, 2016) have been extraordinary. Public sector banks (followed by private banks) have fueled this growth. Graph 6 and 7 indicate the growing adoption of NEFT as a convenient option for money transfers.
- As indicated in Illustration 1, the average NEFT transaction value over the last 8 years have been about Rs 67000/-.
- Interpreting Graph 3 and 4, it can be said that the average value of transaction per year is quite normal and the skewness is -0.3 approximately. Also the median and mean do not vary too much.

## Sector Based Analysis

- Graph 5 indicates that the total number of transactions in the public sector banks (PSB) is larger than any other sector. The second biggest sector is the private (PVT) sector.
- Graph 6 reveals that even though the number of transactions of public sector banks is quite large compared to that of private sector, the value of transactions isn't significantly large. This indicates that the average value of transactions done in PVT sector is larger than the average value of transactions done in the PSB sector.

## Seasonal Trends

- Looking at Graph 1 and 2 plots, it can be seen that the number of transactions (as well as volume of transactions) are particularly high during the months of March, September/October and December.
- While we do not have backing data, we think this behavior may be attributed to year end closing being in March, festive seasons during September/October and calendar year end during December.

## De-monetization & Impact

- Unfortunately, RBI publishes the numbers for the prior month around the 3<sup>rd</sup> week of the next month (Nov 2016 report will be out by the 20<sup>th</sup> Dec 2016) due to which we are unable to get a sense of the impact at this point in time.
- Looking at Graph 5, 6 and 7, it can be seen that the number of transactions (as well as volume of transactions) are growing considerably. With more emphasis on a cashless society and electronic payment modes, this growth can be expected to be significantly more steeper in the near future.

## Appendix

### R Packages

- ggplot2
- car
- moments
- gridExtra

### Annexures

- NeftAnalysis.R – The executable where all the analysis resides
- NeftData.R – Sources the data from the RBI excel dataset and is used by the NeftAnalysis.R script

## References

- RBI Official Web site ([www.rbi.org](http://www.rbi.org))
- RBI NEFT Web site (<https://rbi.org.in/SCRIPTS/NEFTView.aspx>)
- R Documentation Web site
- R Bloggers Web site
- R Studio documentation