MA374-Financial Engineering Laboratory
Assignment 6

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11012338

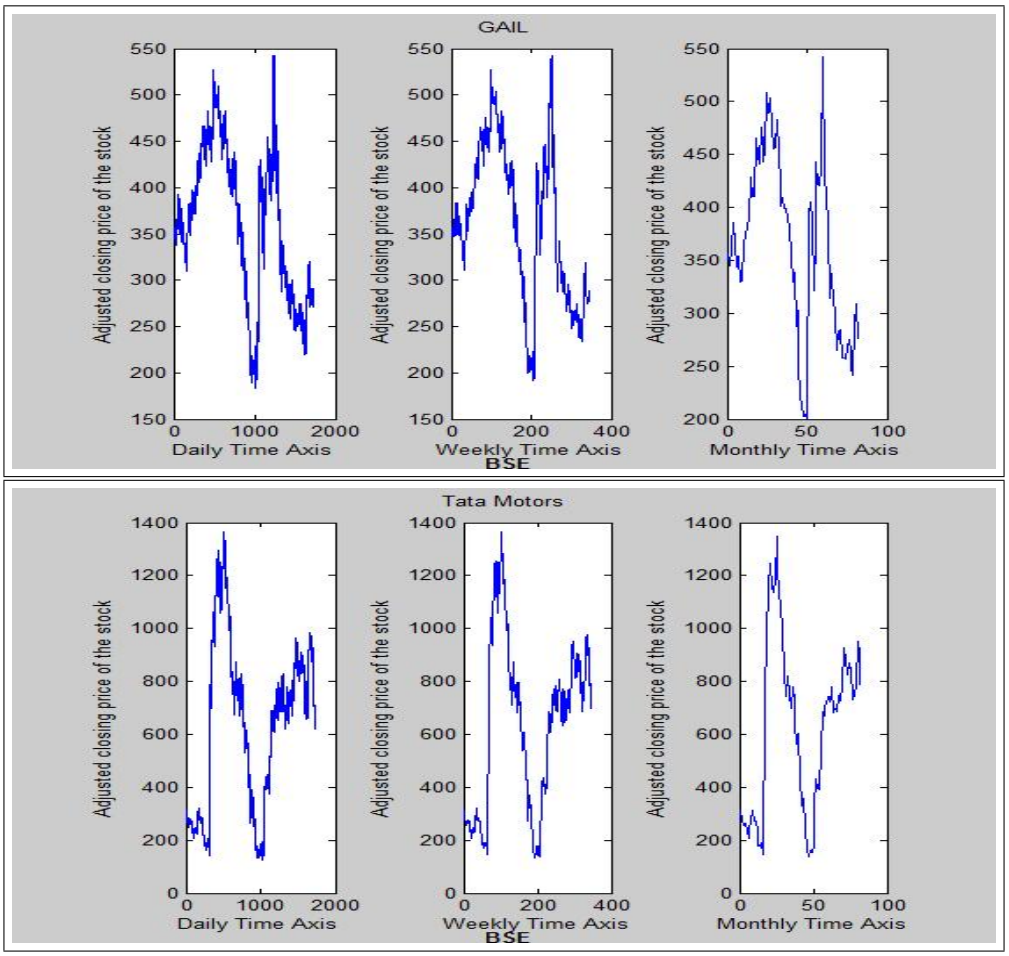
February 18, 2014

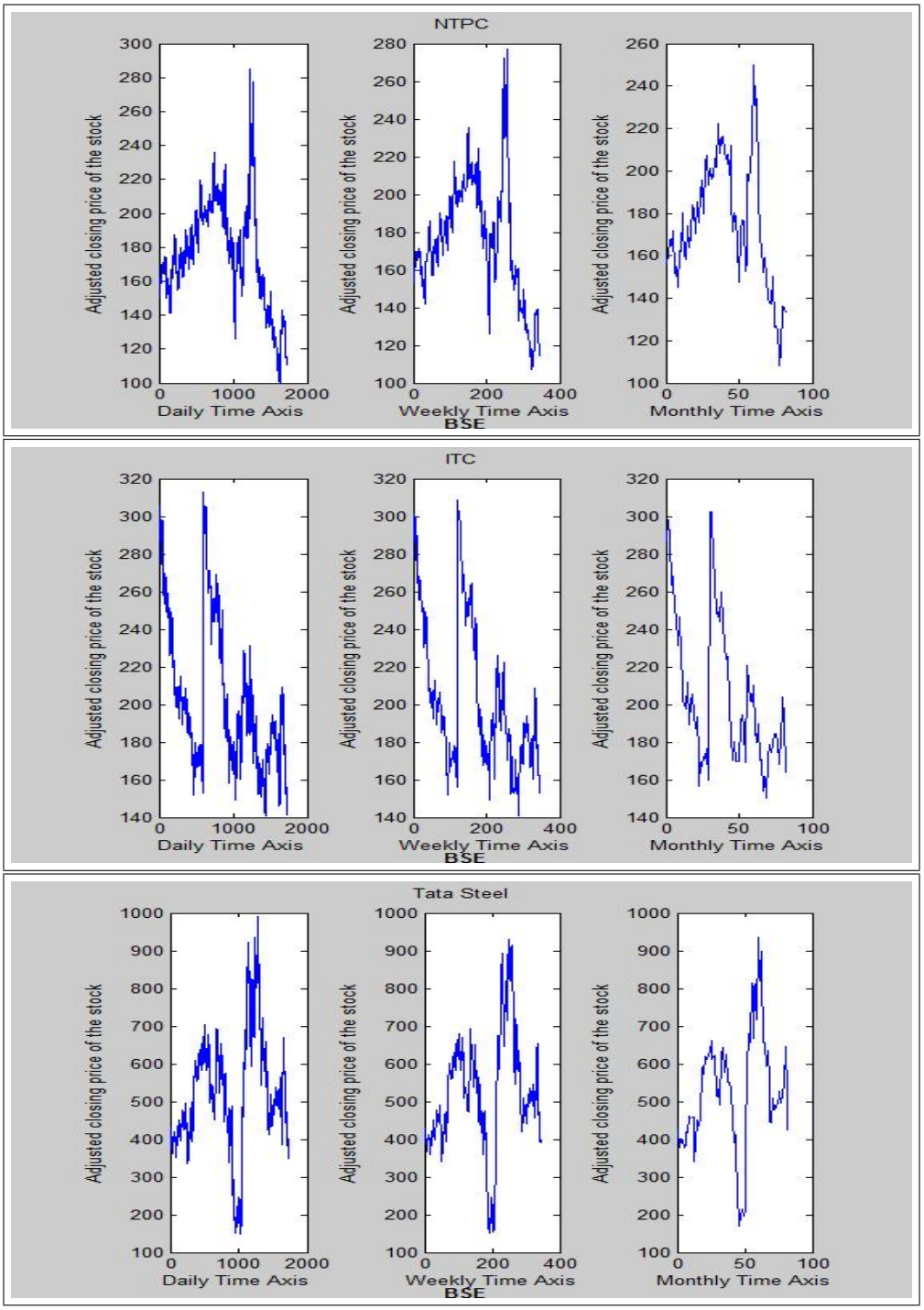
Contents

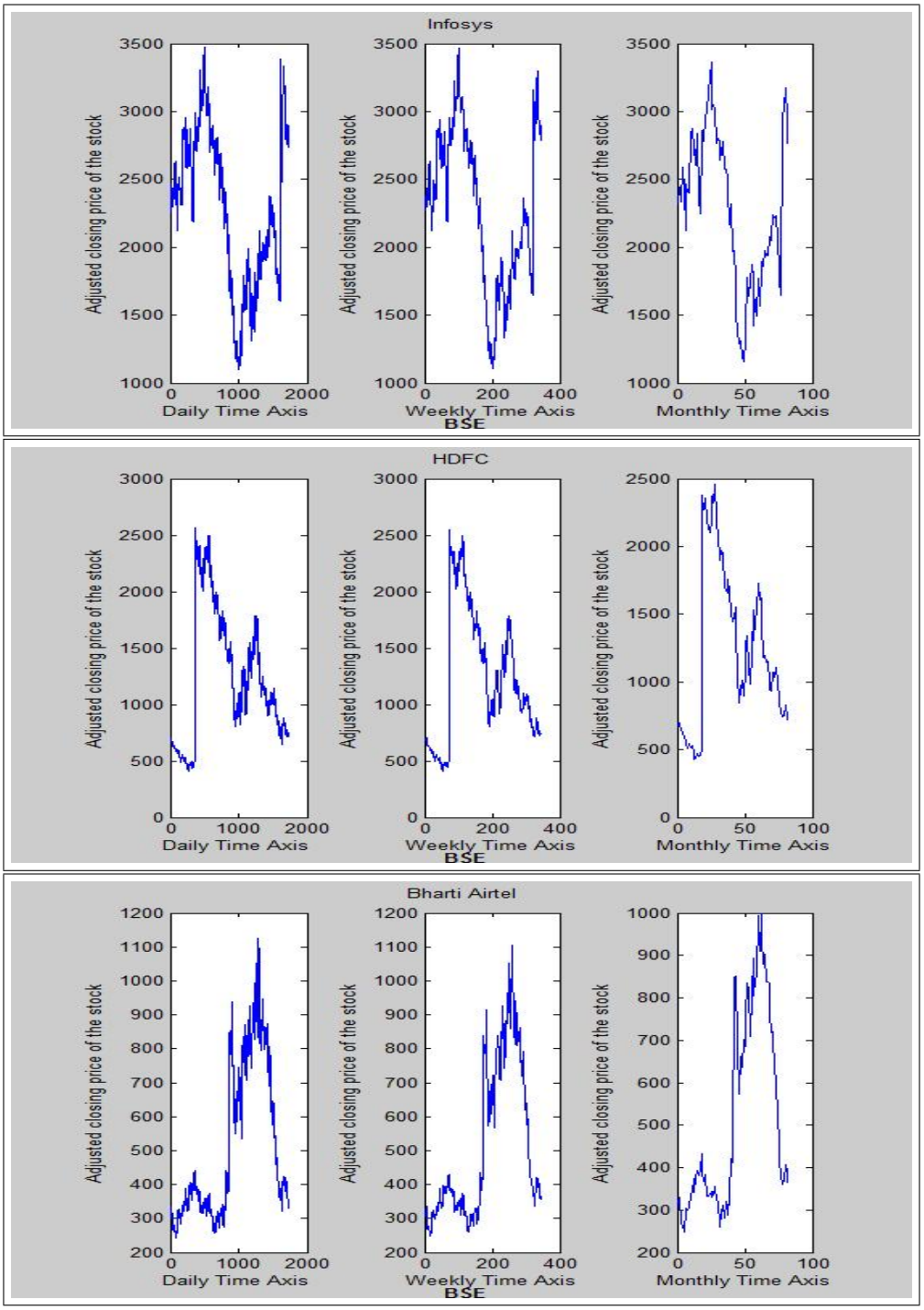
1 Question 1

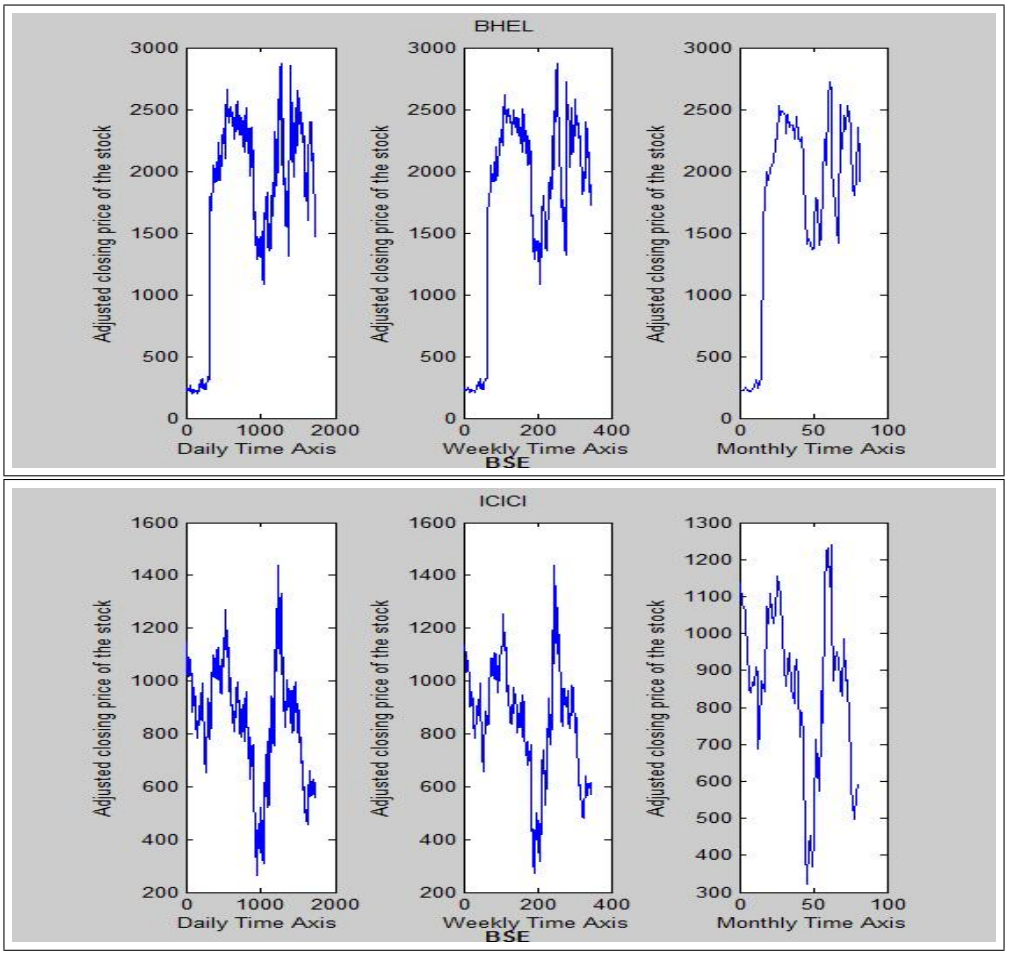
The data has been enclosed in csv format for both BSE and NSE.

1.1 Daily,Weekly and Monthly Analysis of Ten Stocks using BSE

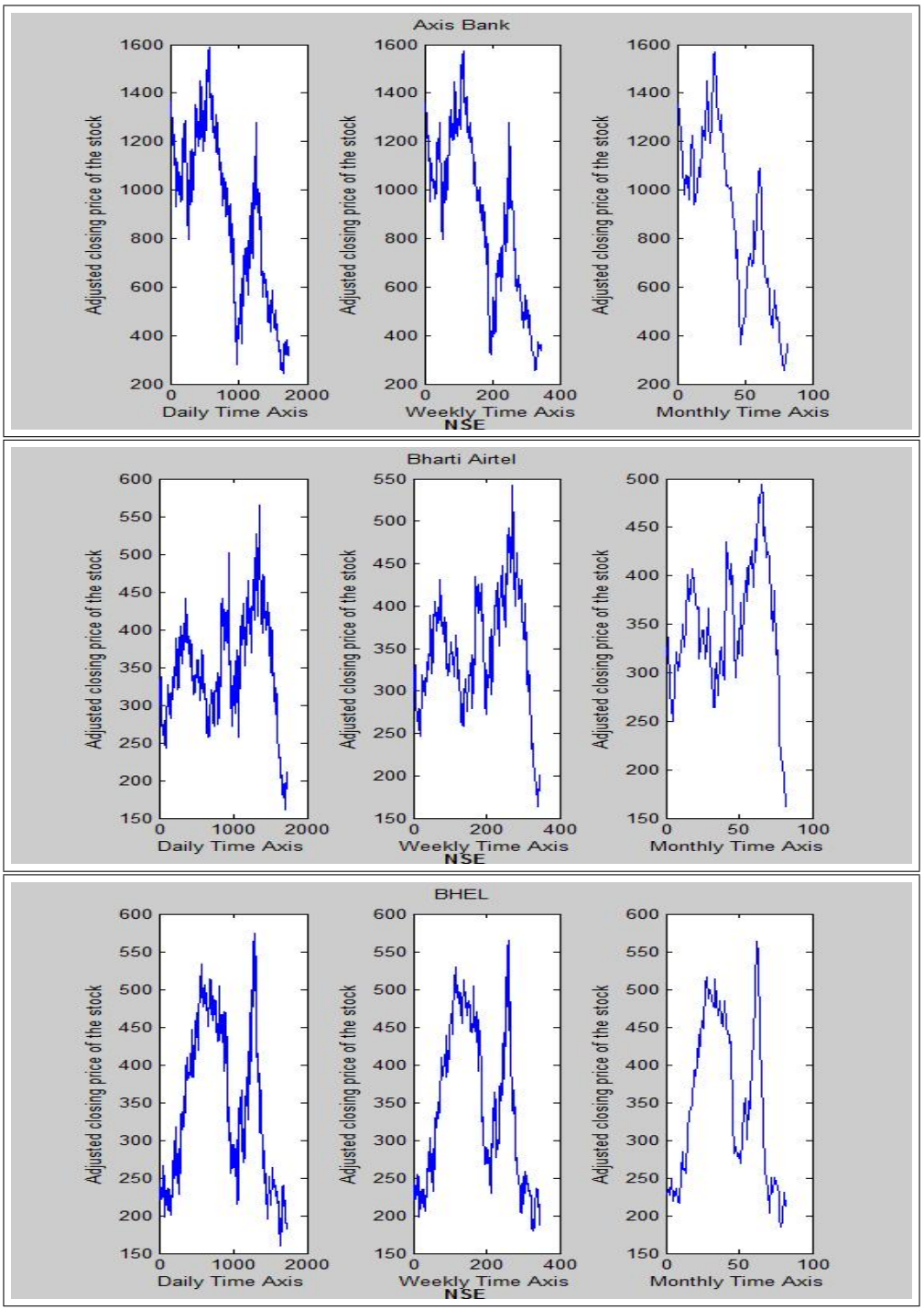


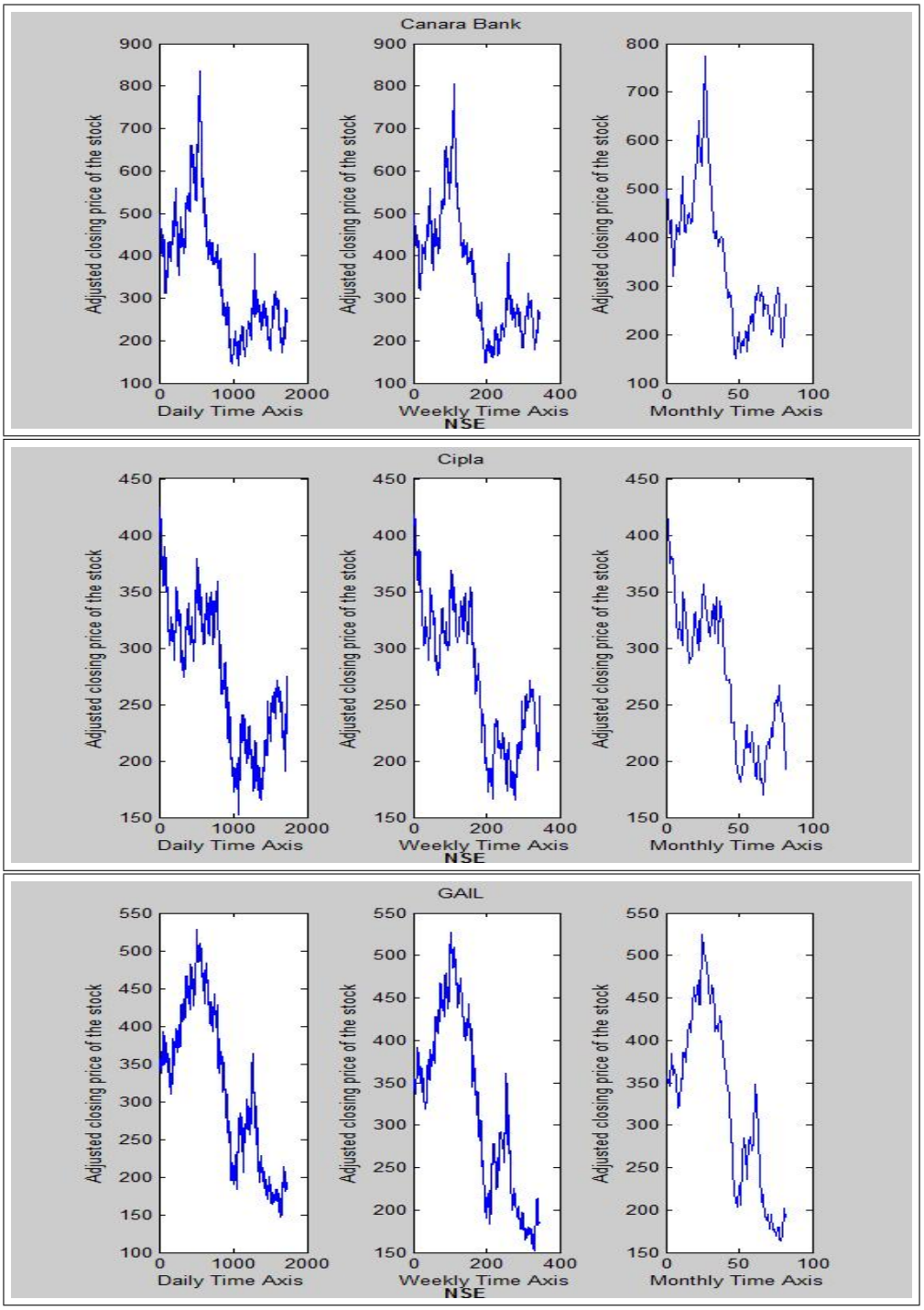

NTPC
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
BSE
ITC
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
BSE
Tata Steel
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
BSE

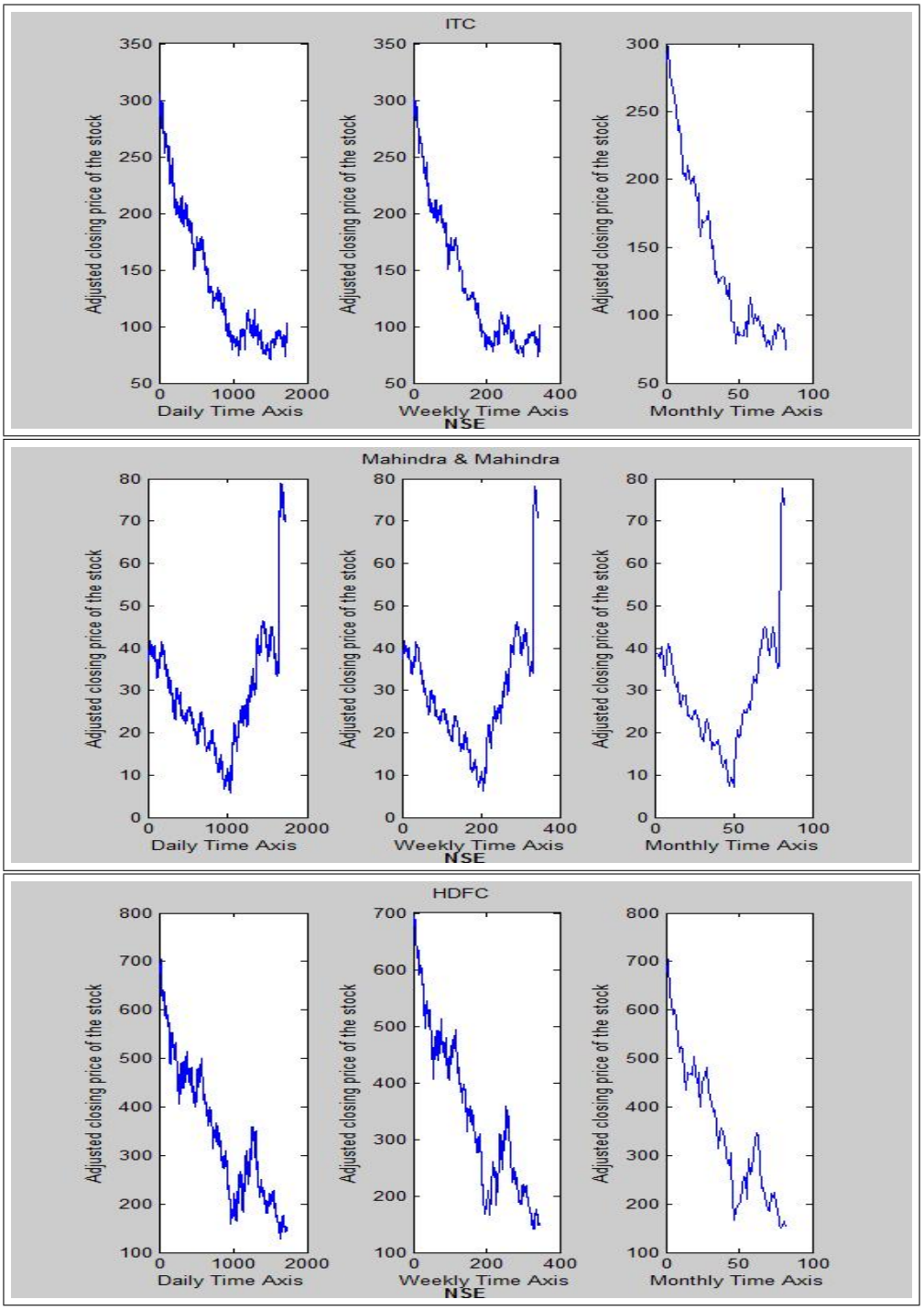

Infosys
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
BSE
HDFC
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
BSE
Bharti Airtel
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
BSE

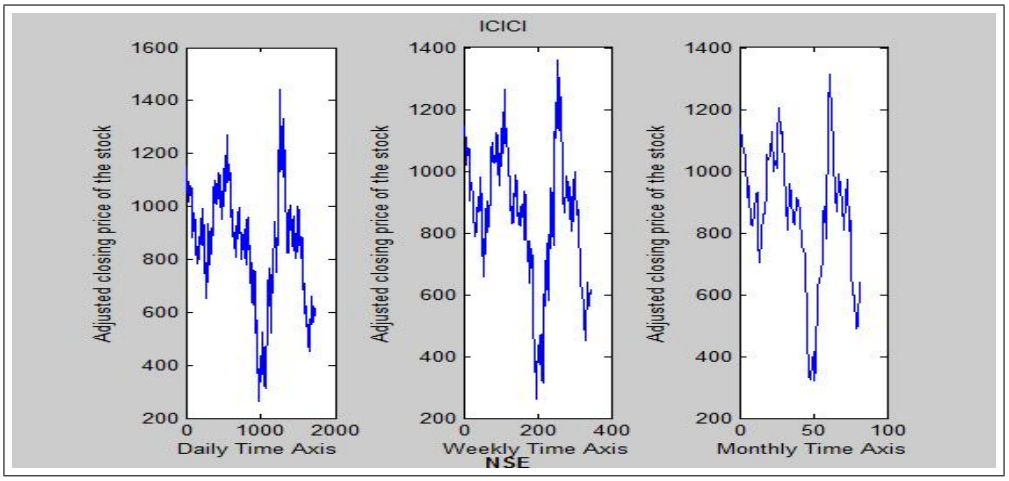

BHEL
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
BSE
ICICI
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
BSE

1.2 Daily,Weekly and Monthly Analysis of Ten Stocks using NSE




Canara Bank
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
NSE
Cipla
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
NSE
GAIL
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
NSE

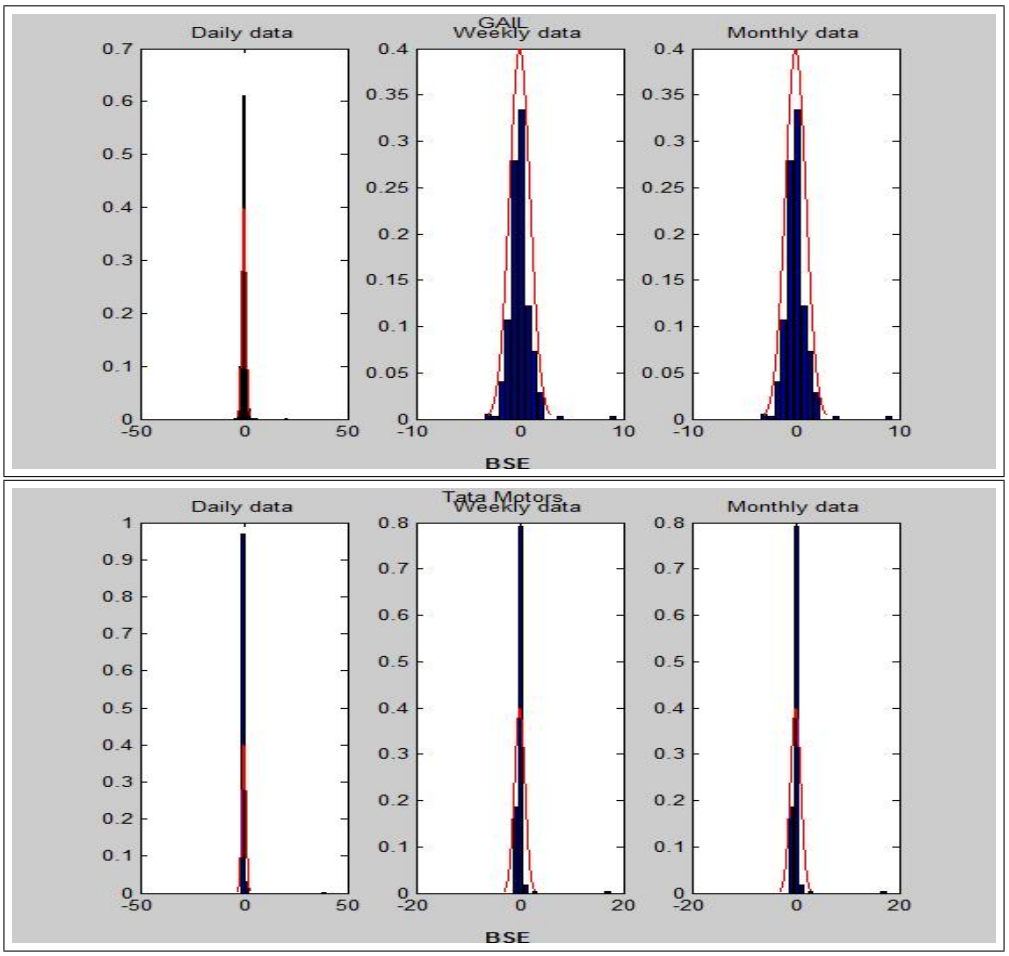

ITC
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
NSE
Mahindra & Mahindra
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
NSE
HDFC
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
NSE

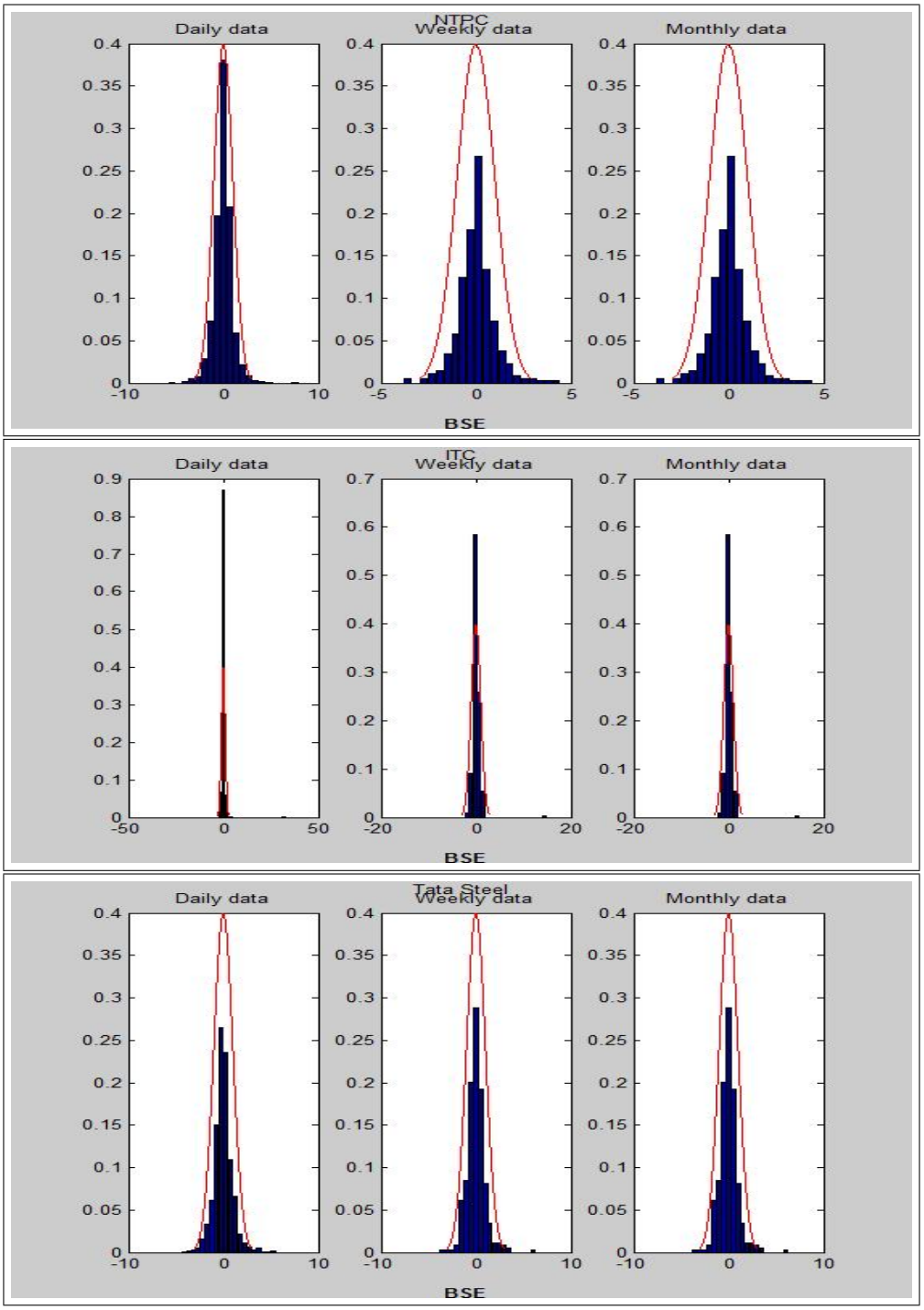

ICICI
Adjusted closing price of the stock
Daily Time Axis
Weekly Time Axis
Monthly Time Axis
NSE

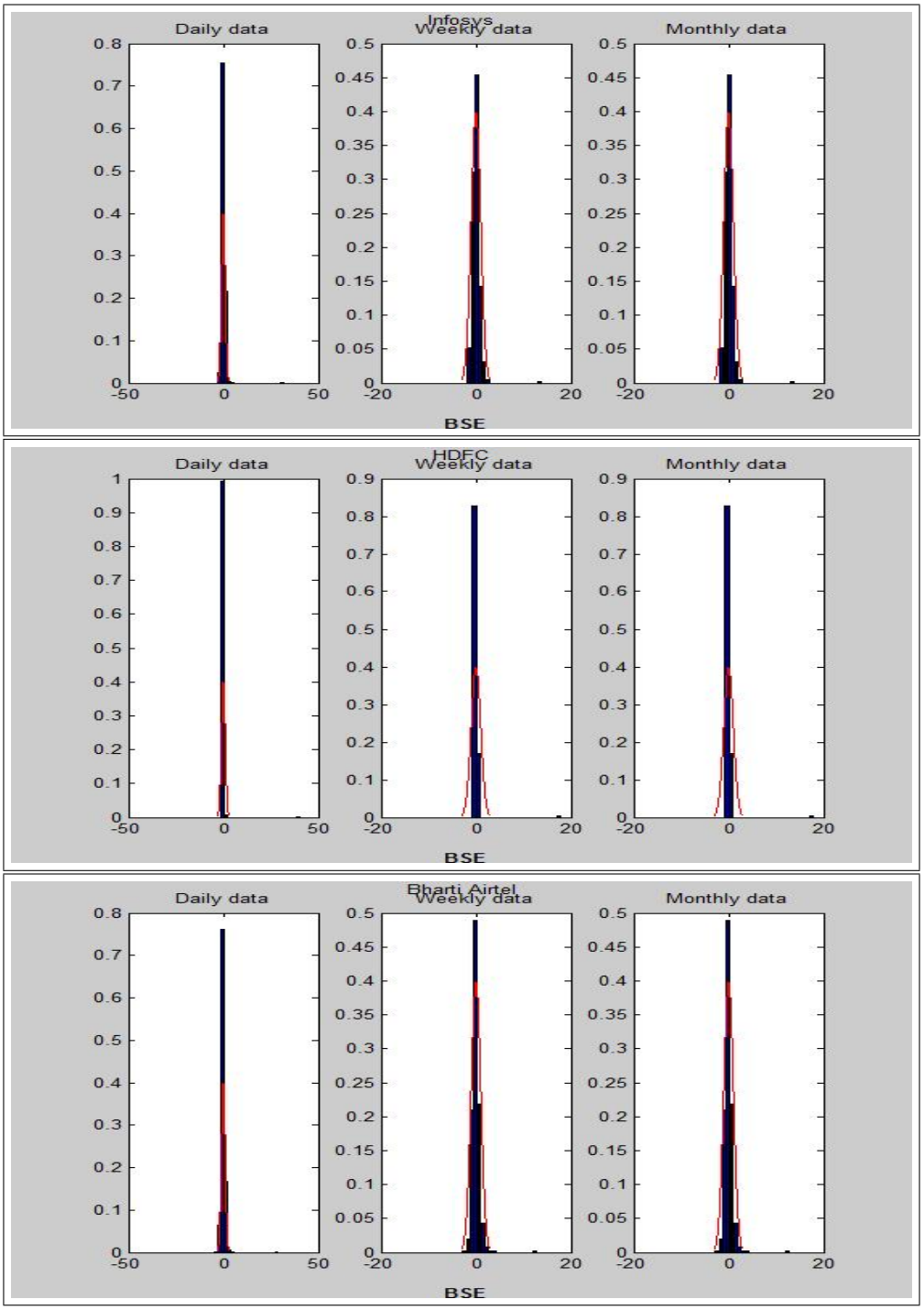
2 Question 2

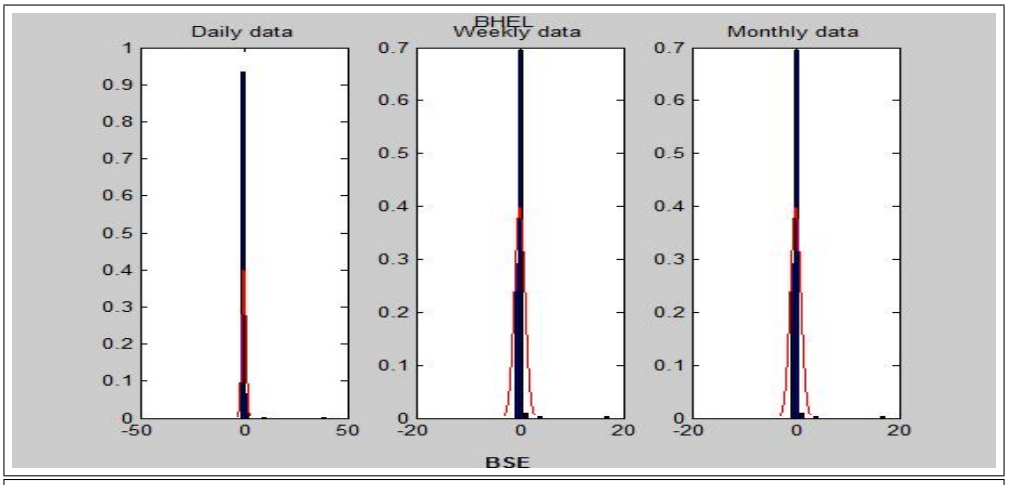
.

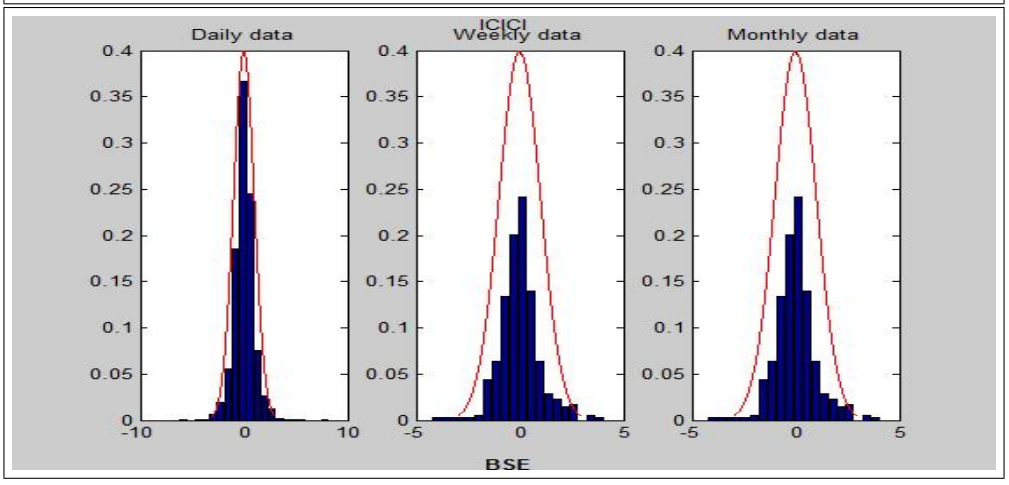
2.1 Daily,Weekly and Monthly Analysis of Ten Stocks using BSE



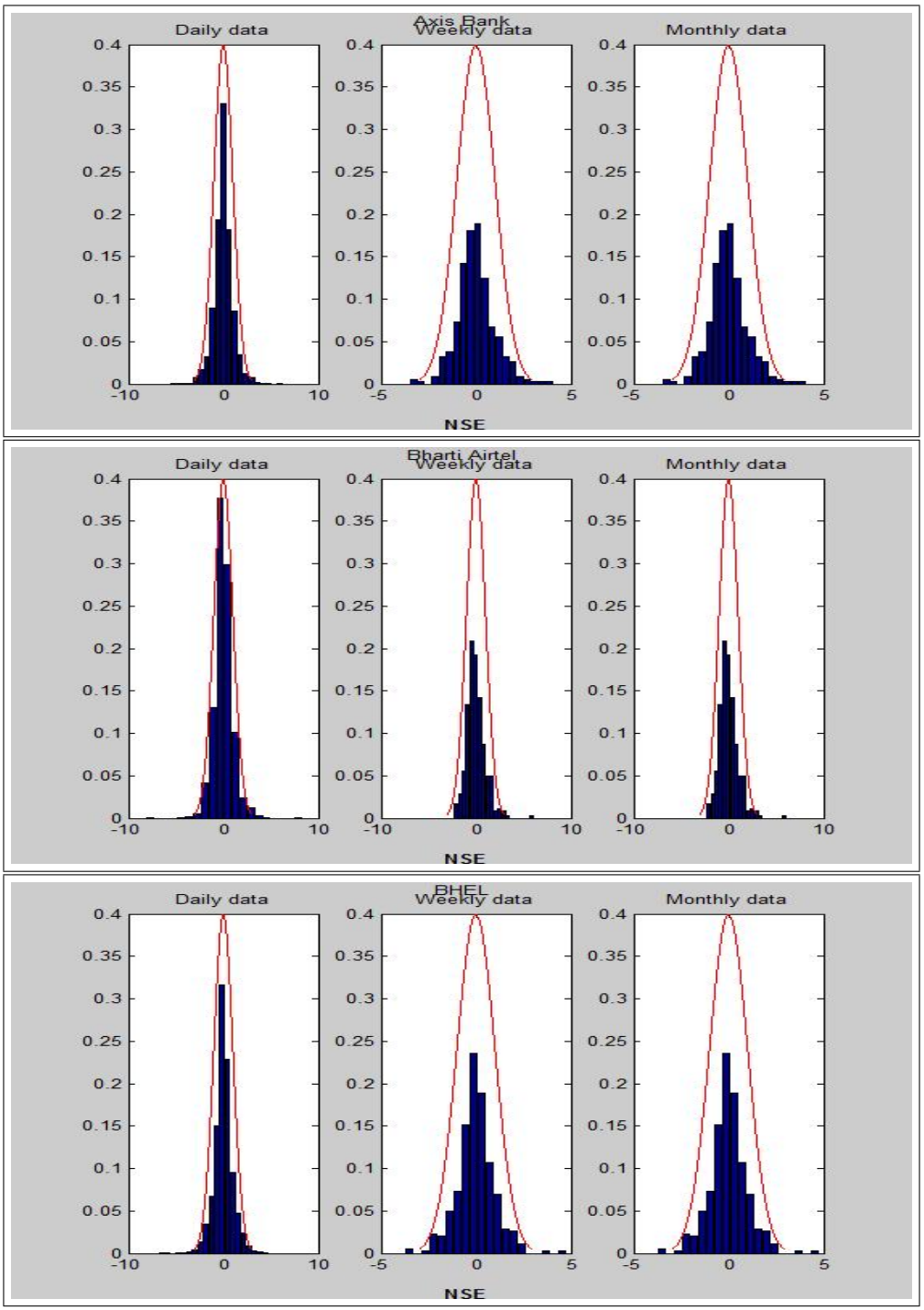

NTPC
Daily data
Weekly data
Monthly data
BSE
ITC
Daily data
Weekly data
Monthly data
BSE
Tata Steel
Daily data
Weekly data
Monthly data
BSE

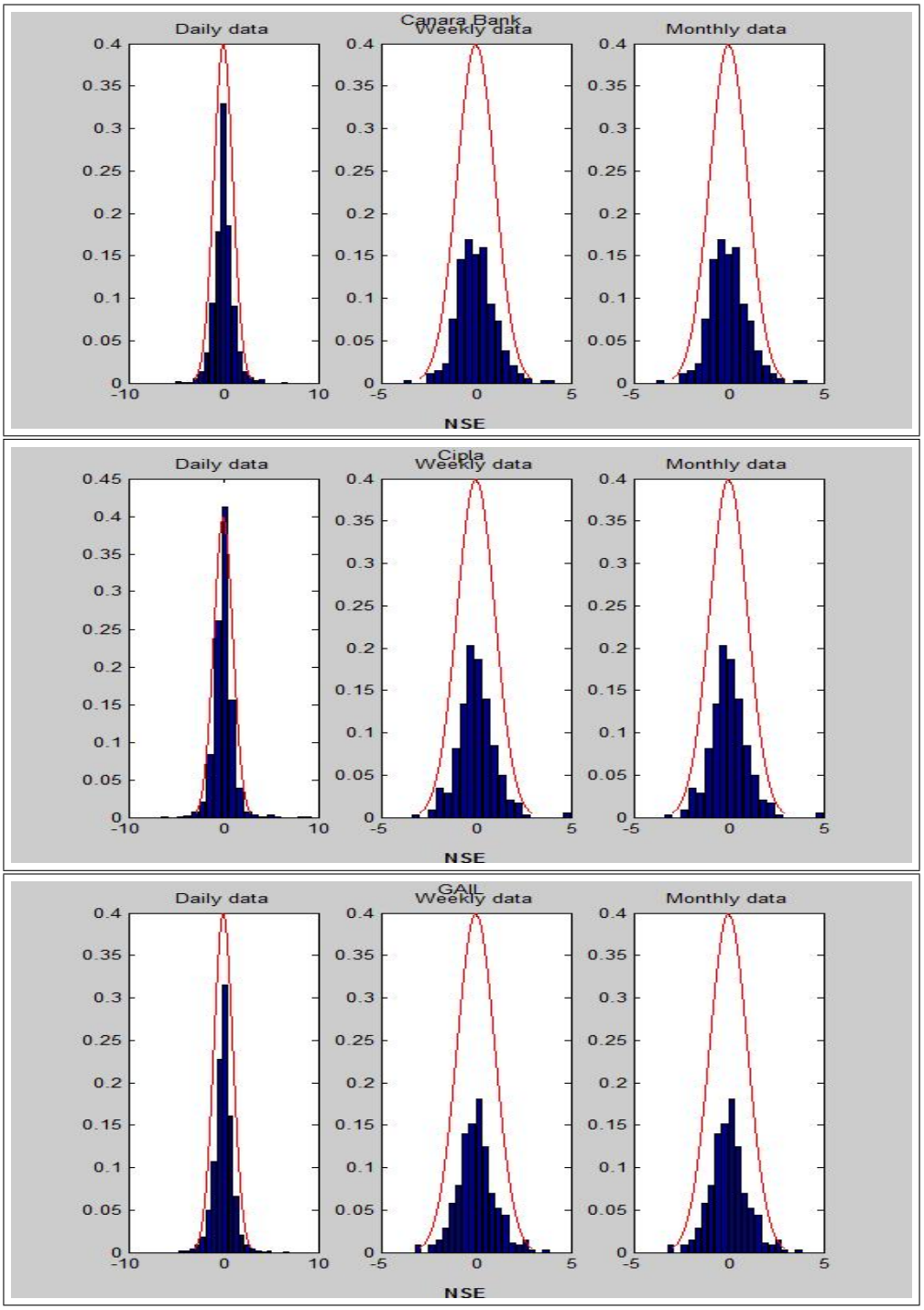

Infosys
Daily data
Weekly data
Monthly data
BSE
HDFC
Daily data
Weekly data
Monthly data
BSE
Bharti Airtel
Daily data
Weekly data
Monthly data
BSE

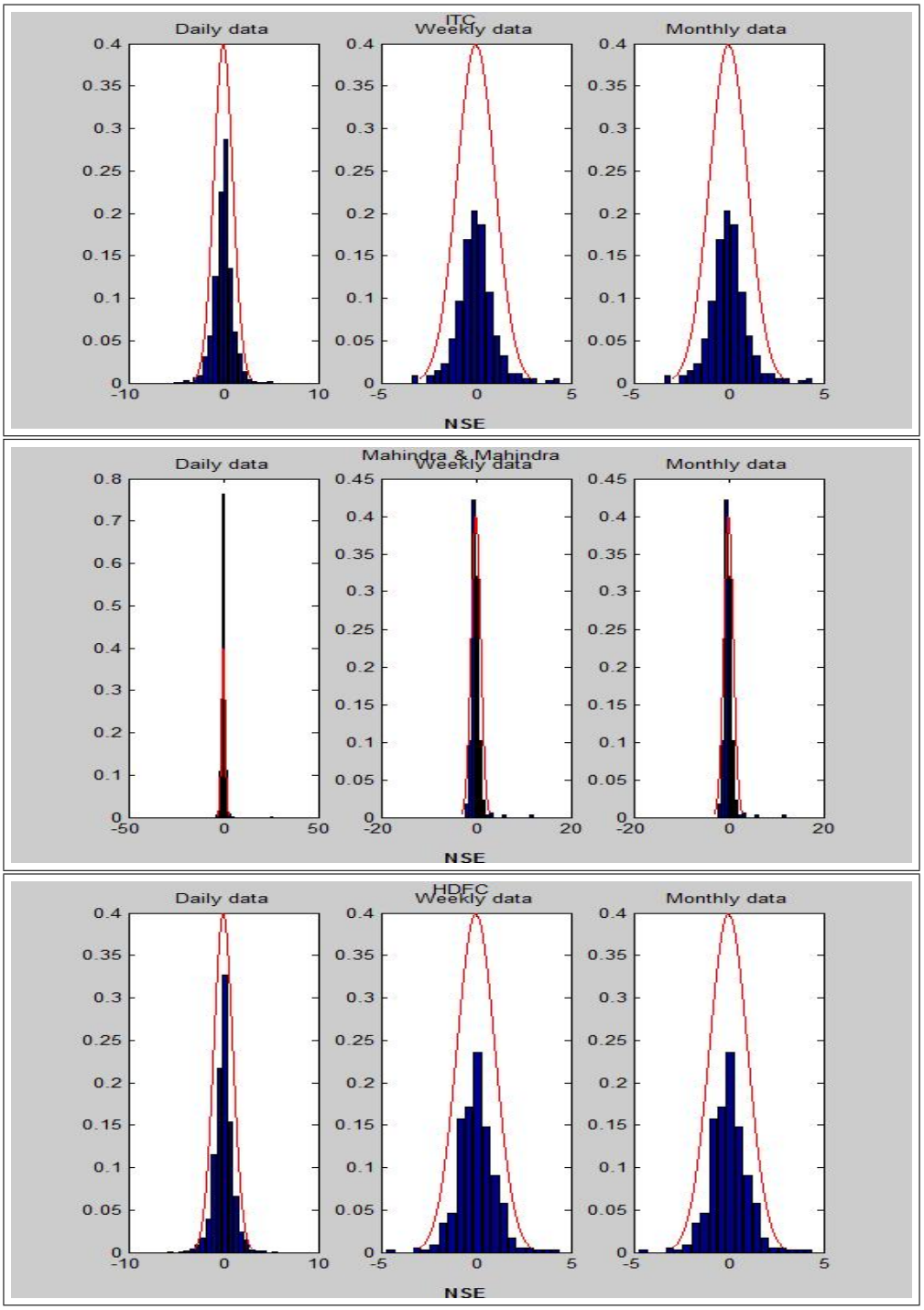

BHEL
Daily data
Weekly data
Monthly data
BSE

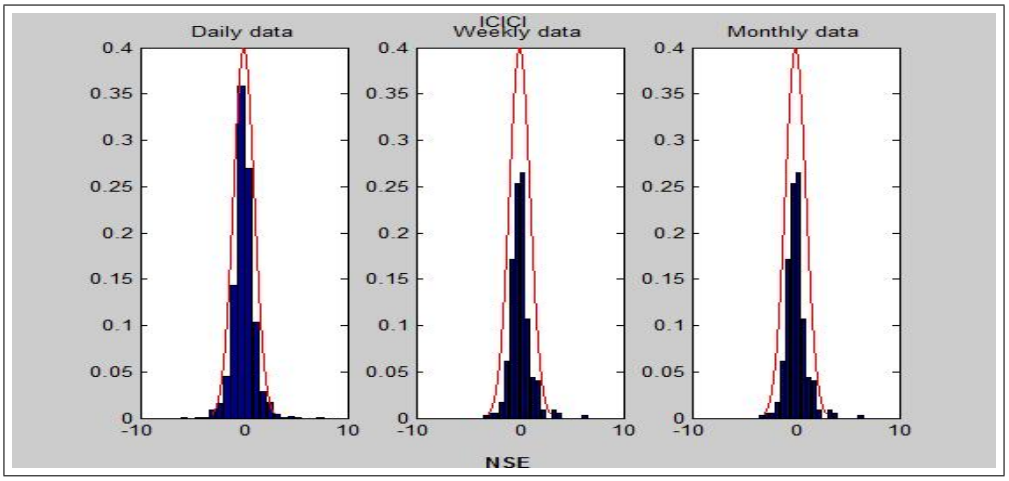

ICICI
Daily data
Weekly data
Monthly data
BSE

2.2 Daily,Weekly and Monthly Analysis of Ten Stocks using NSE




Canara Bank
Daily data
Weekly data
Monthly data
NSE
Cipla
Daily data
Weekly data
Monthly data
NSE
GAIL
Daily data
Weekly data
Monthly data
NSE

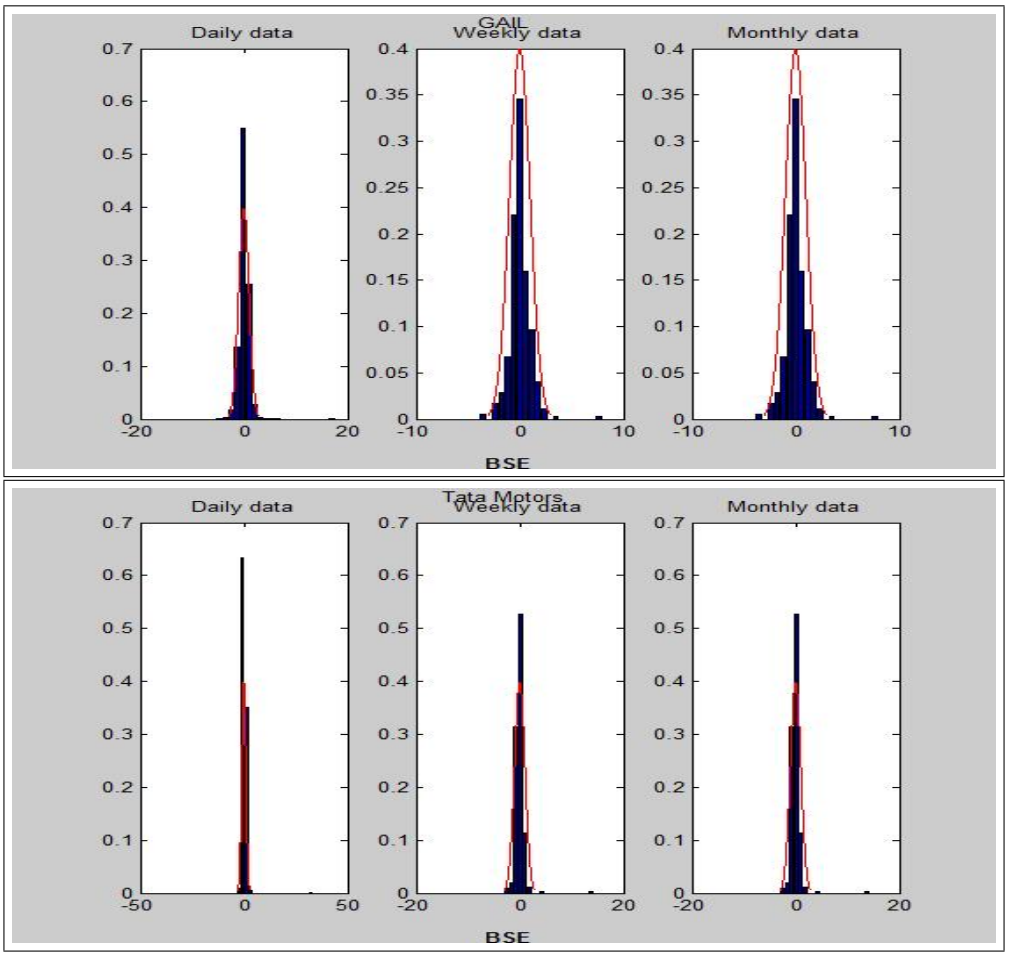

ITC
Daily data
Weekly data
Monthly data
NSE
Mahindra & Mahindra
Daily data
Weekly data
Monthly data
NSE
HDFC
Daily data
Weekly data
Monthly data
NSE

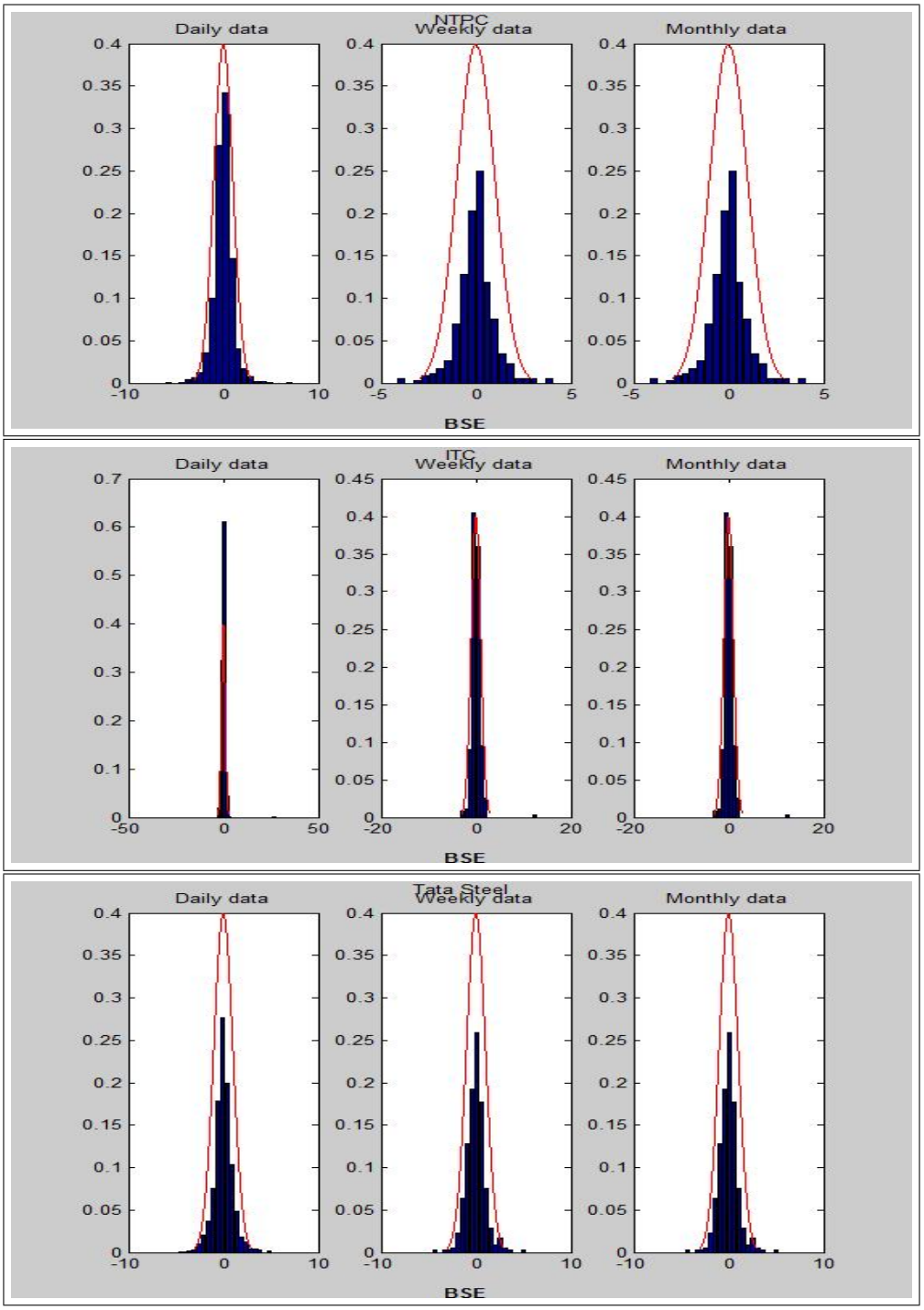

ICICI
Daily data
Weekly data
Monthly data
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-10
0
10
NSE

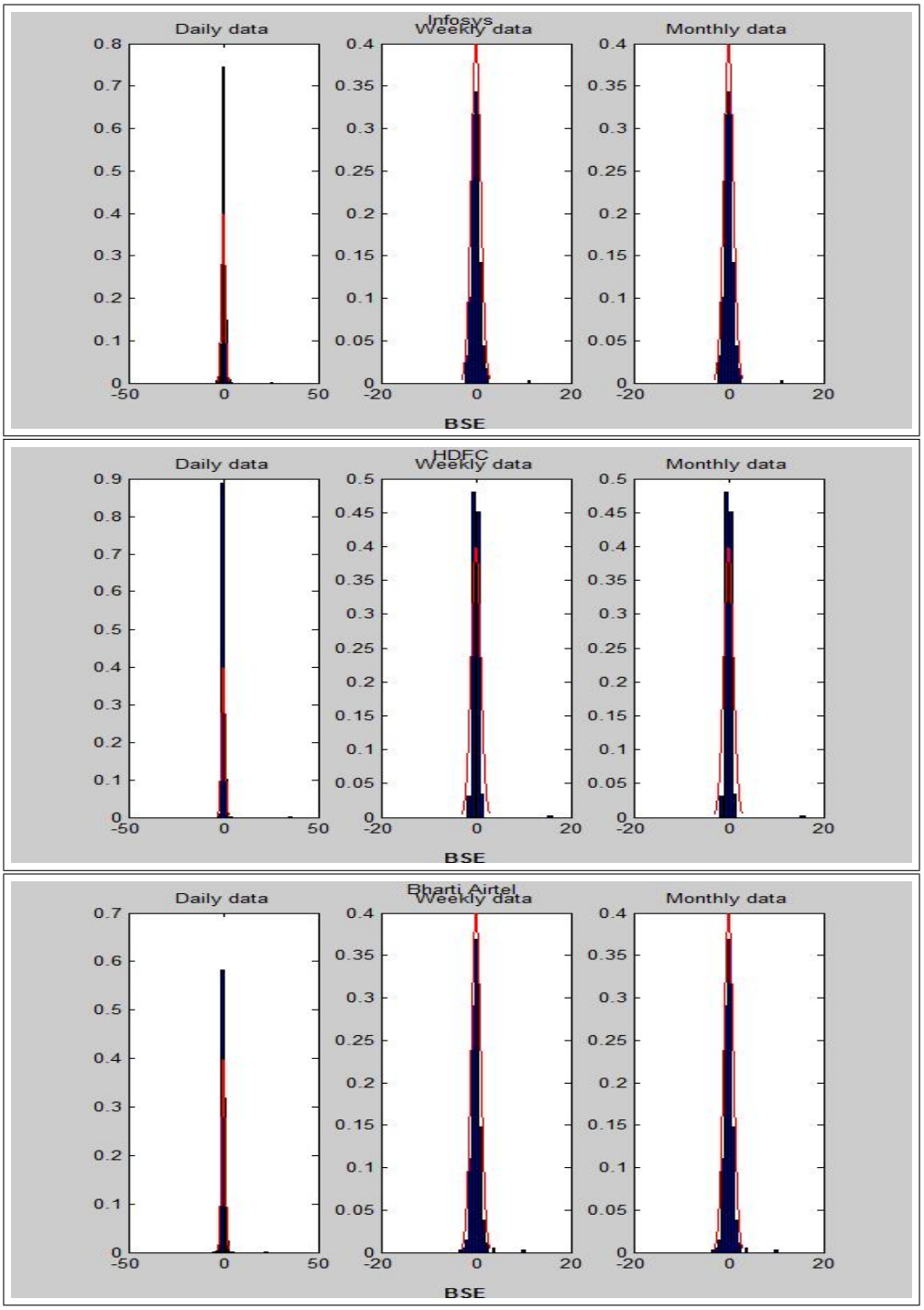
3 Question 3

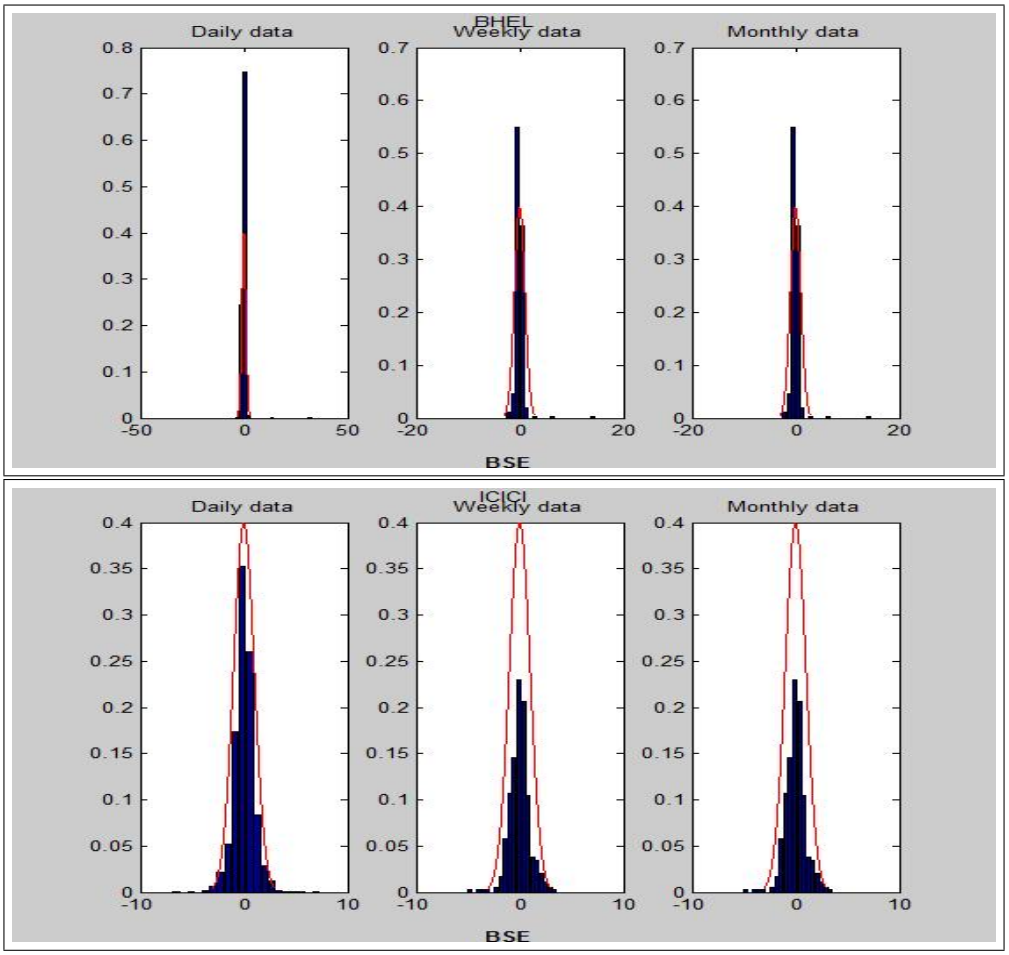
.

3.1 Daily,Weekly and Monthly Analysis of Ten Stocks using BSE

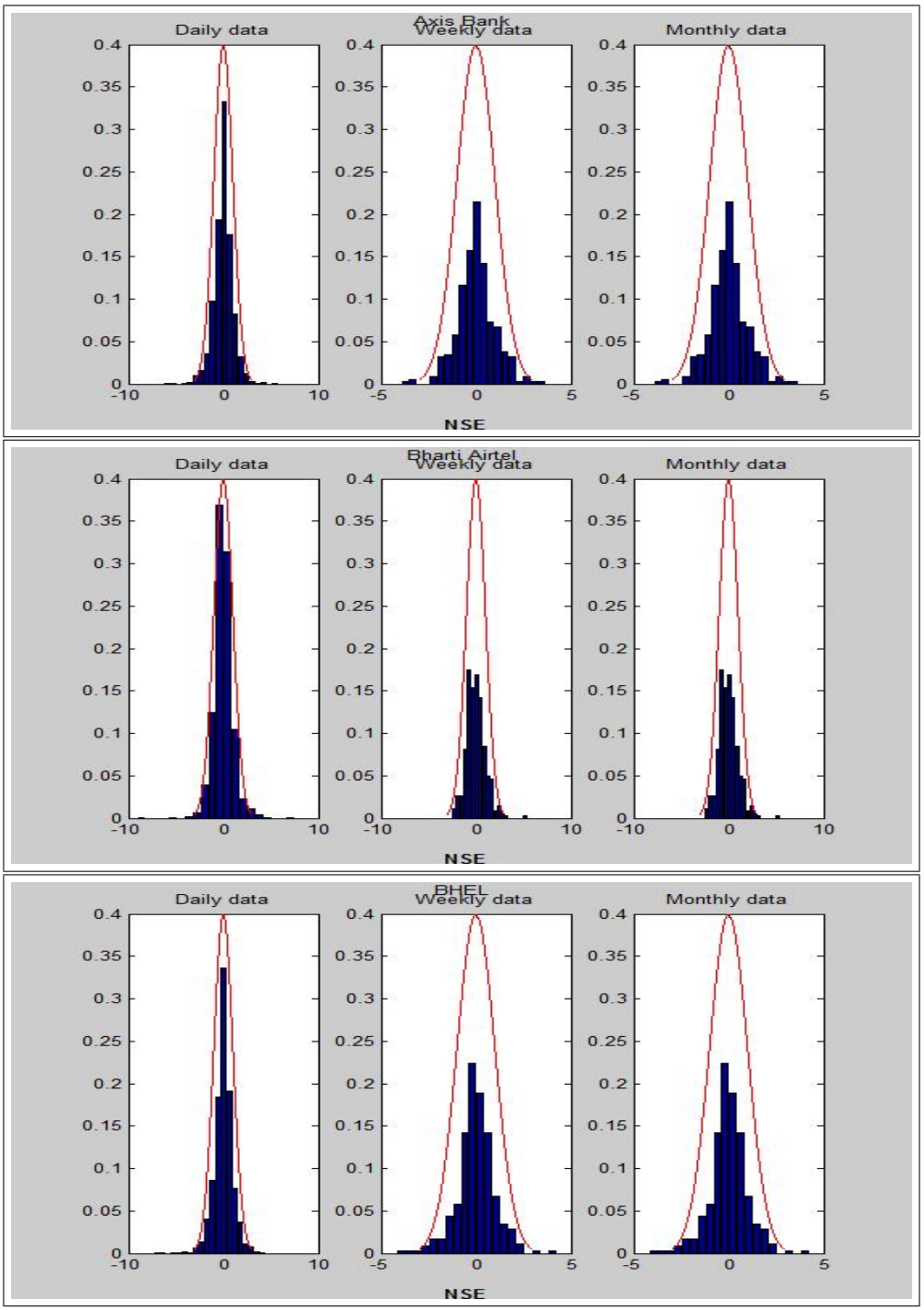


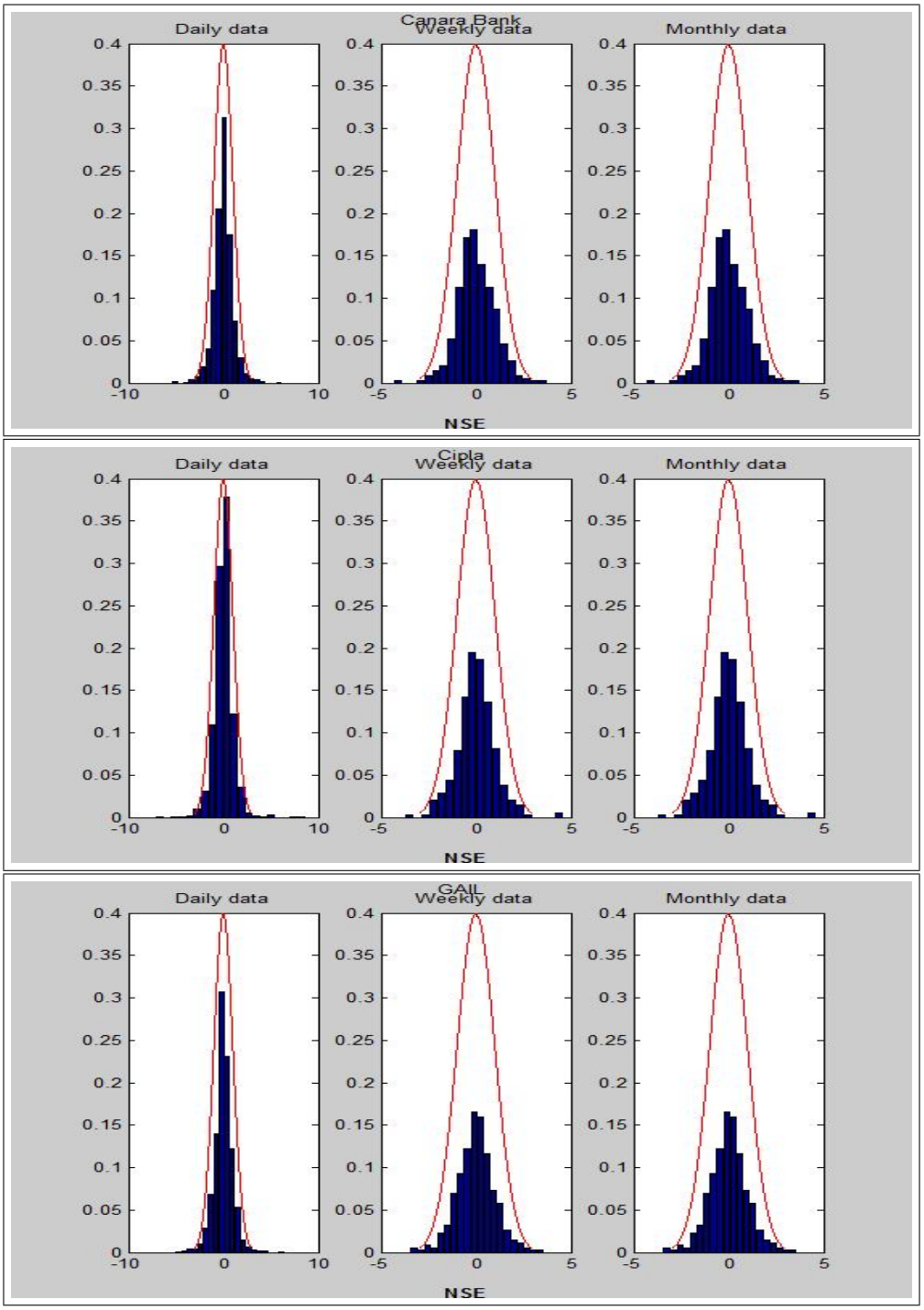

NTPC
Daily data
Weekly data
Monthly data
BSE
ITC
Daily data
Weekly data
Monthly data
BSE
Tata Steel
Daily data
Weekly data
Monthly data
BSE

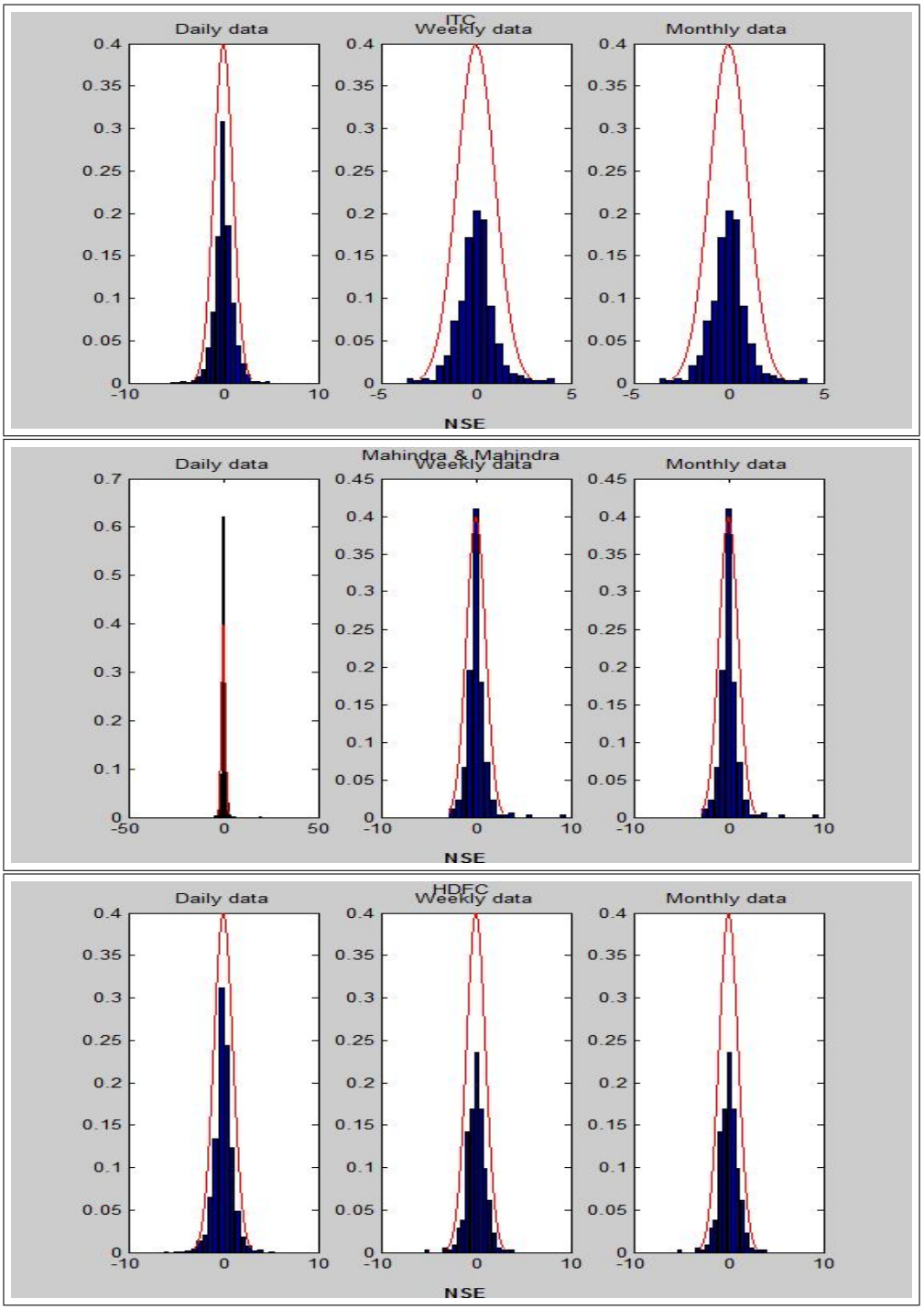

Infosys
Daily data
Weekly data
Monthly data
BSE
HDFC
Daily data
Weekly data
Monthly data
BSE
Bharti Airtel
Daily data
Weekly data
Monthly data
BSE

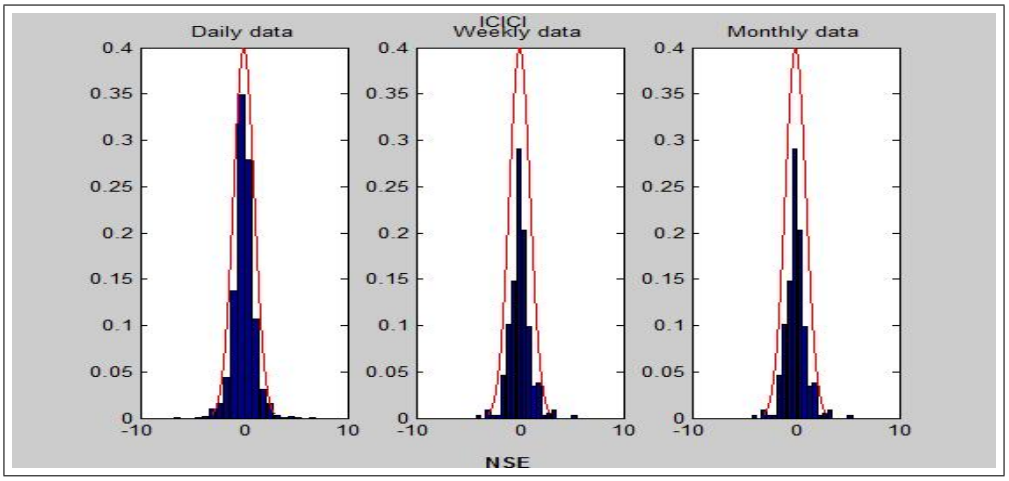

BHEL
Daily data
Weekly data
Monthly data
BSE
ICICI
Daily data
Weekly data
Monthly data
BSE

3.2 Daily,Weekly and Monthly Analysis of Ten Stocks using NSE




Canara Bank
Daily data
Weekly data
Monthly data
NSE
Cipla
Daily data
Weekly data
Monthly data
NSE
GAIL
Daily data
Weekly data
Monthly data
NSE

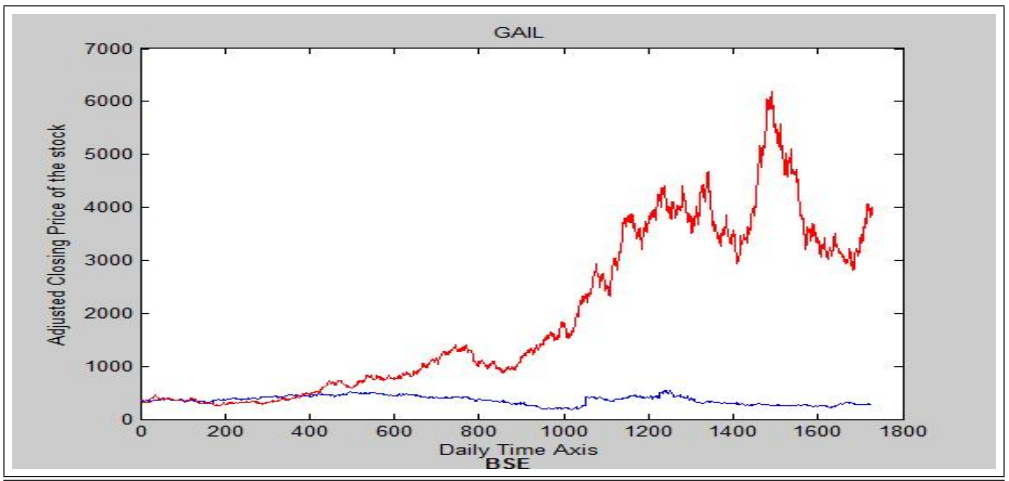

ITC
Daily data
Weekly data
Monthly data
NSE
Mahindra & Mahindra
Daily data
Weekly data
Monthly data
NSE
HDFC
Daily data
Weekly data
Monthly data
NSE

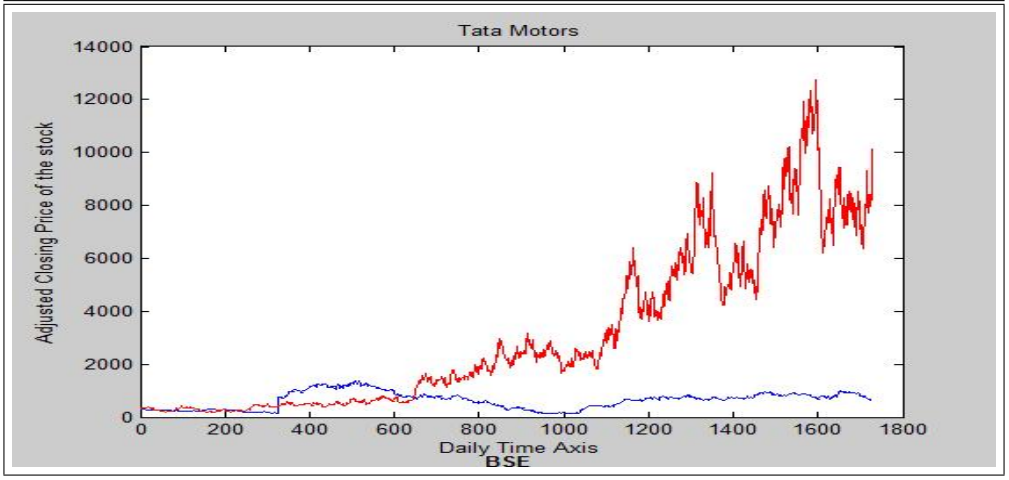

ICICI
Daily data
Weekly data
Monthly data
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-10
0
10
NSE

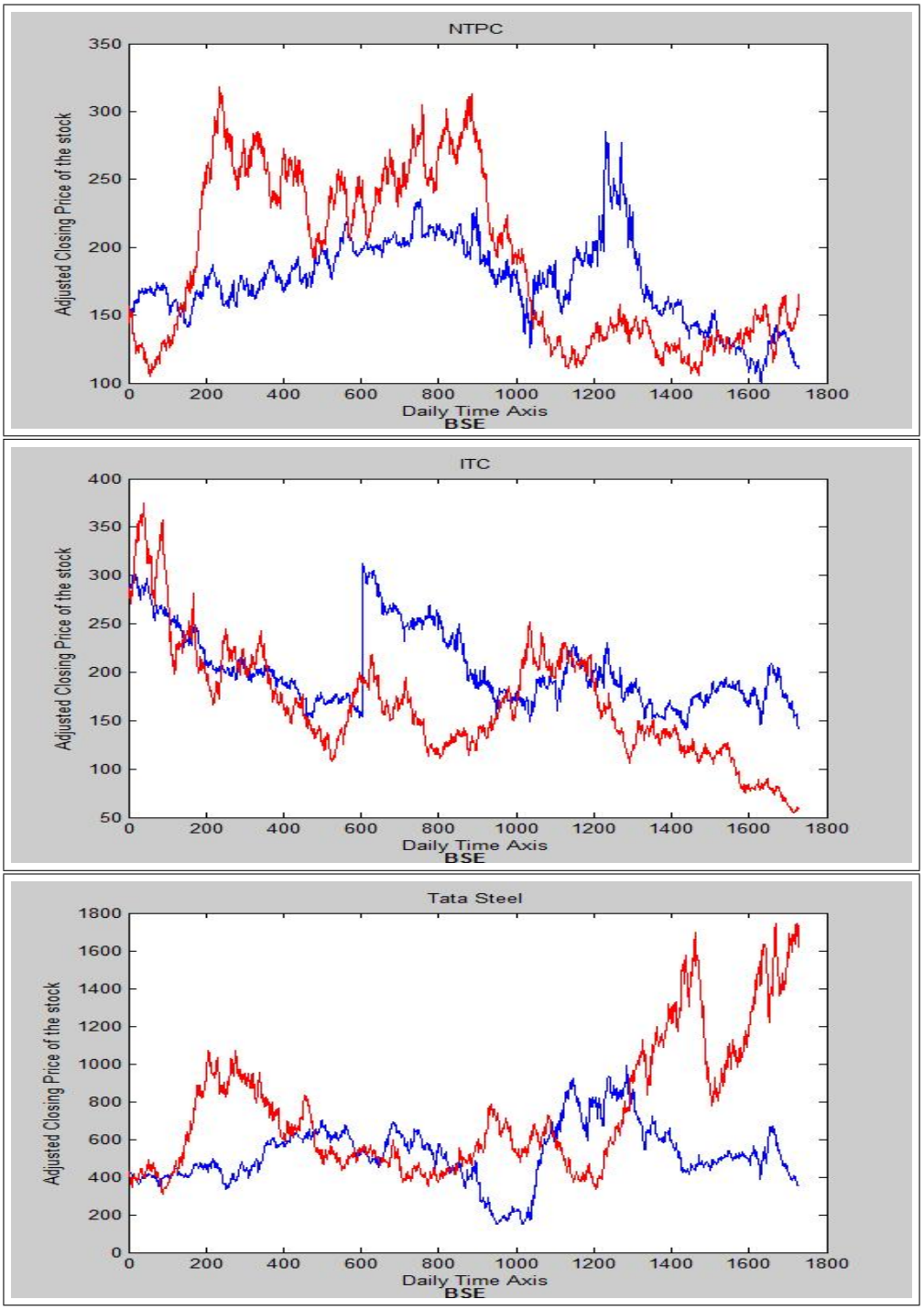
4 Question 4

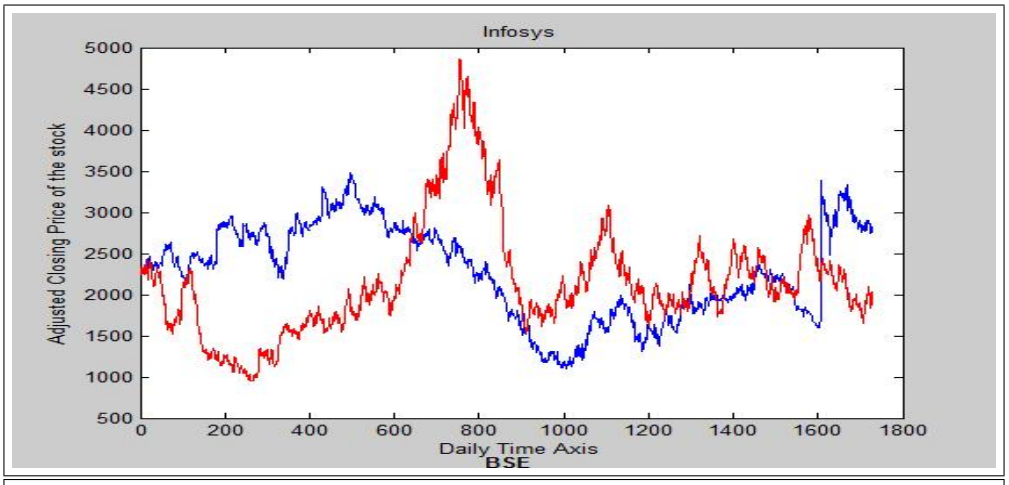
Adjusted closing price of the stock.

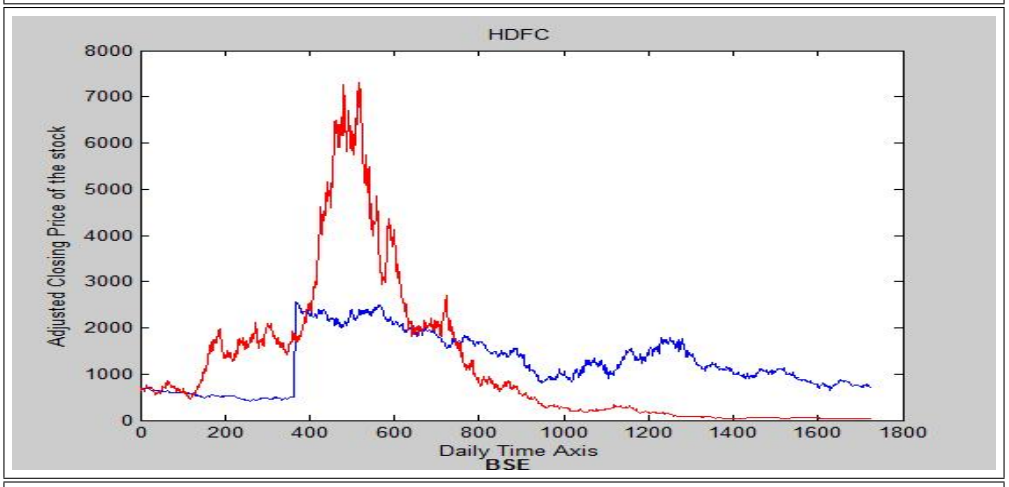
4.1 Daily Analysis of Ten Stocks using BSE

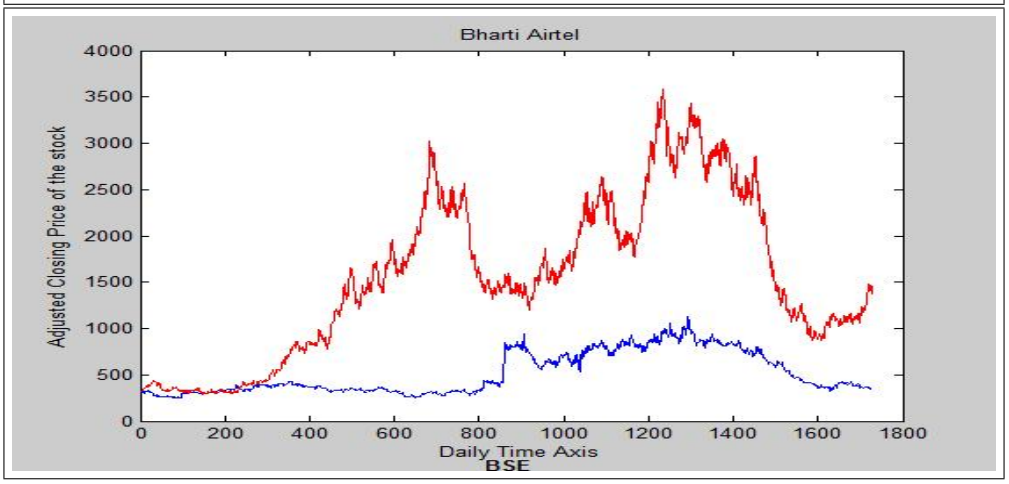


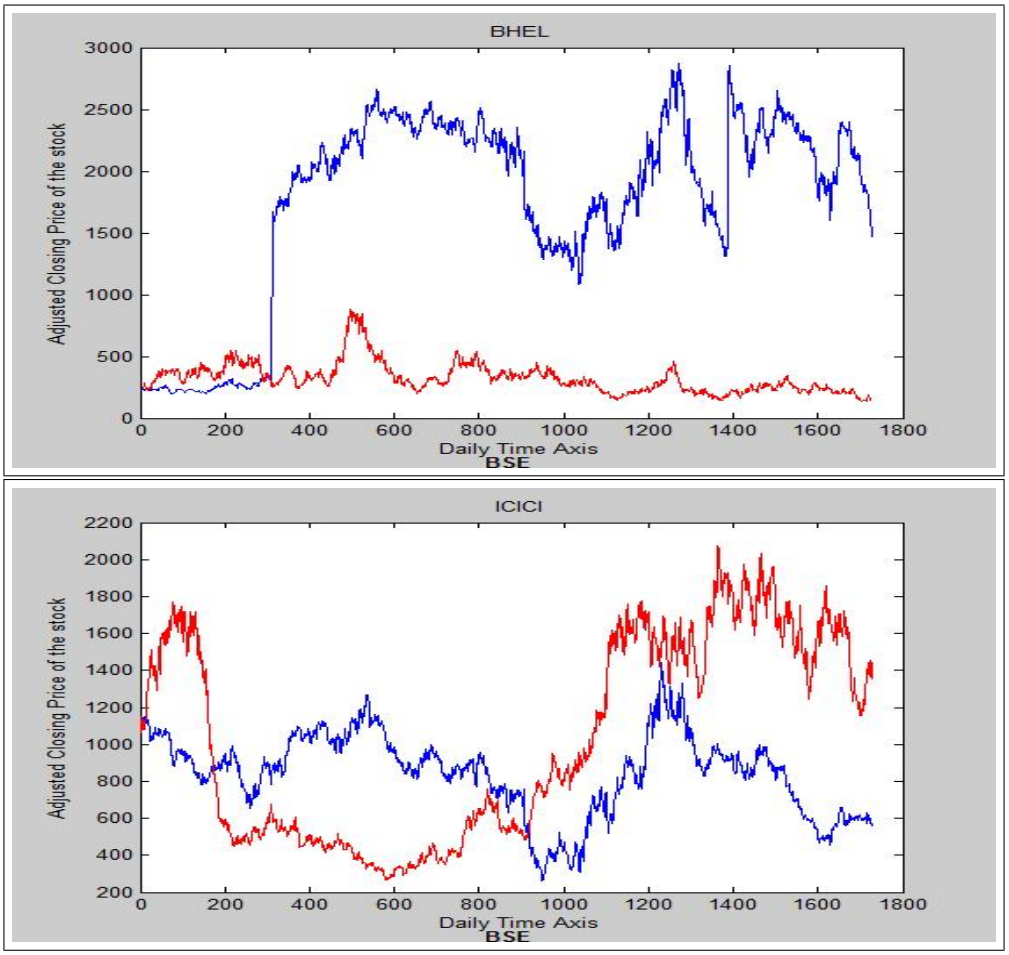



NTPC
Adjusted Closing Price of the stock
Daily Time Axis
BSE
ITC
Adjusted Closing Price of the stock
Daily Time Axis
BSE
Tata Steel
Adjusted Closing Price of the stock
Daily Time Axis
BSE

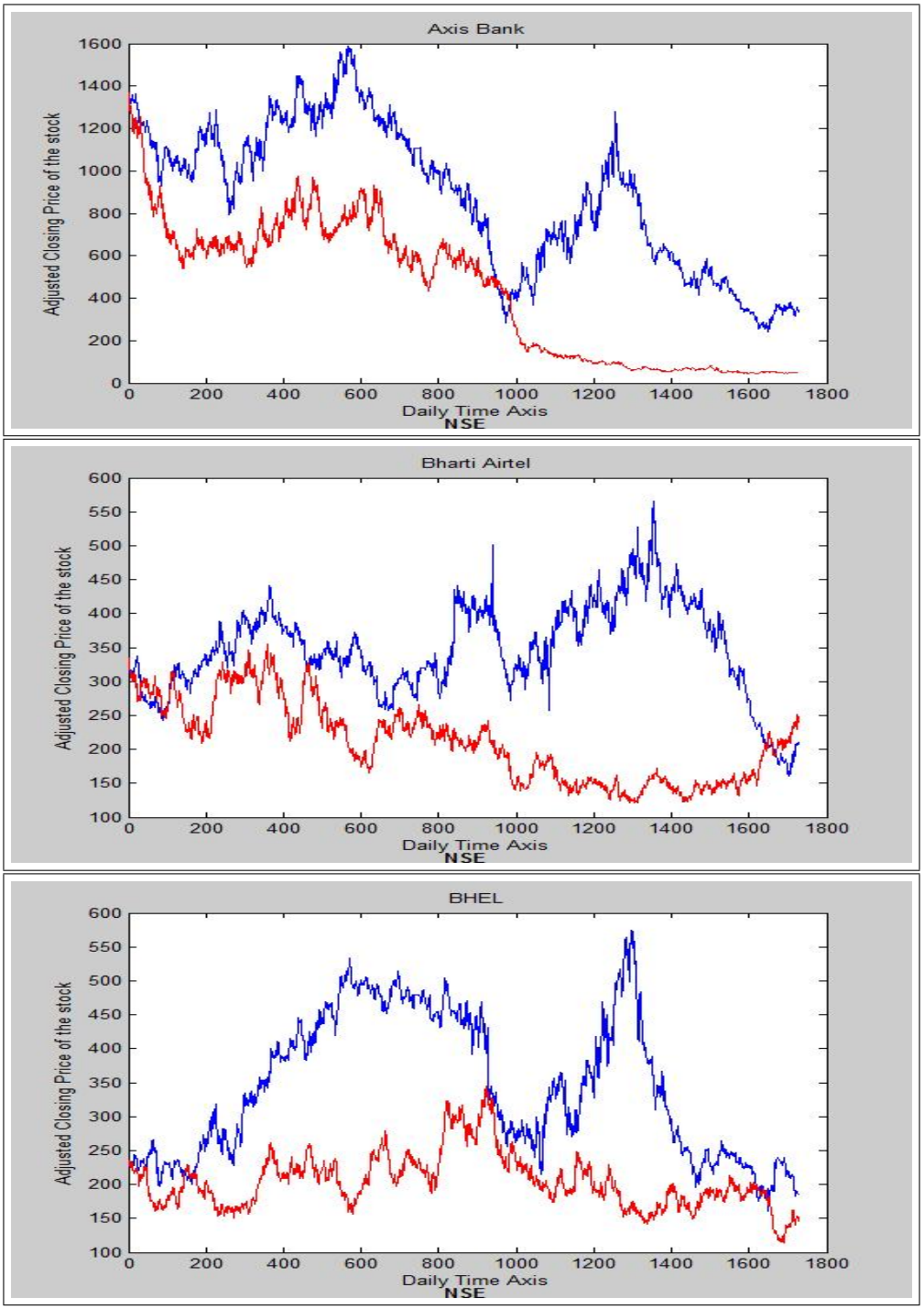

Infosys
Adjusted Closing Price of the stock
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
200
400
600
800
1000
1200
1400
1600
1800
Daily Time Axis
BSE

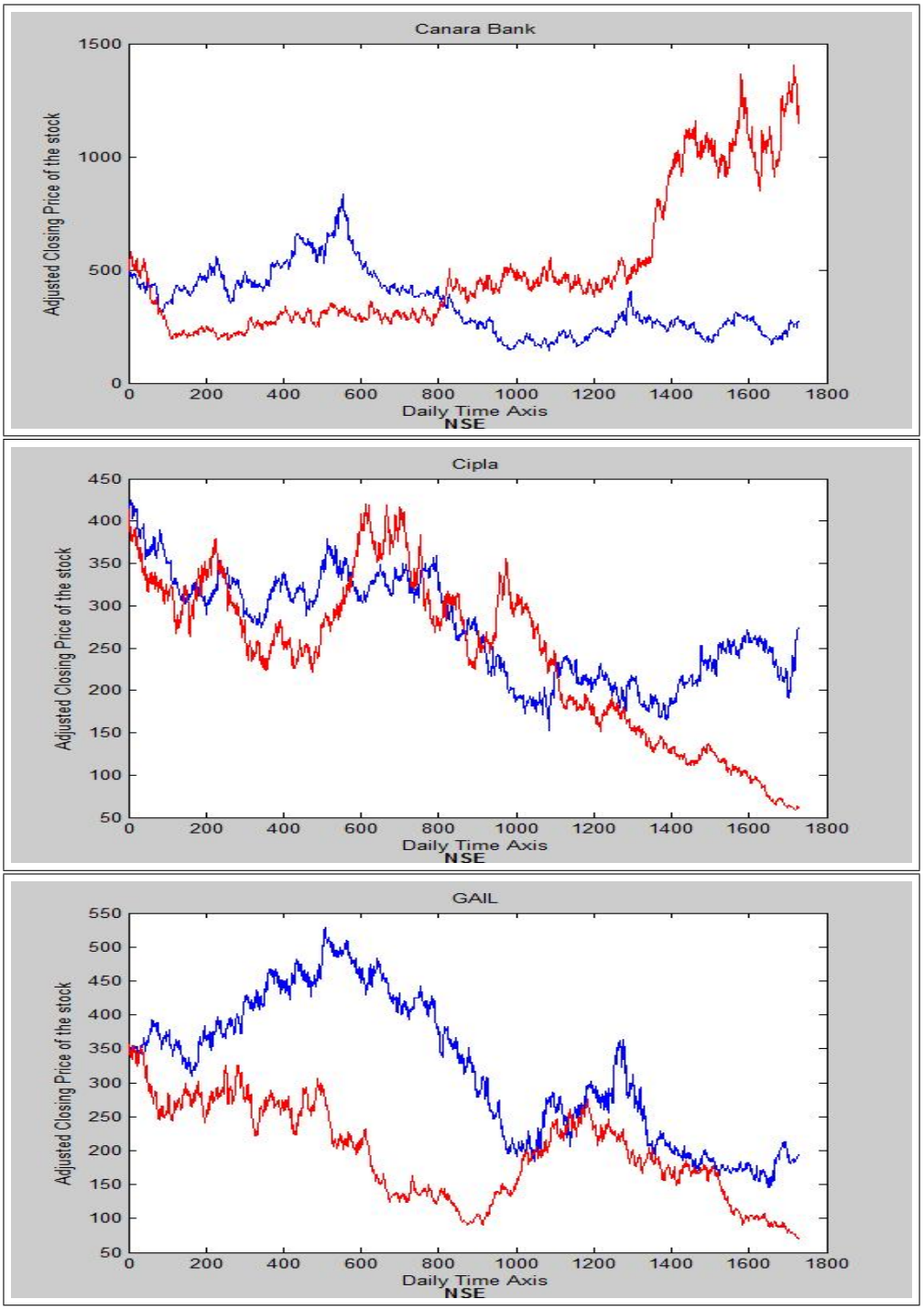

HDFC
Adjusted Closing Price of the stock
8000
7000
6000
5000
4000
3000
2000
1000
0
200
400
600
800
1000
1200
1400
1600
1800
Daily Time Axis
BSE

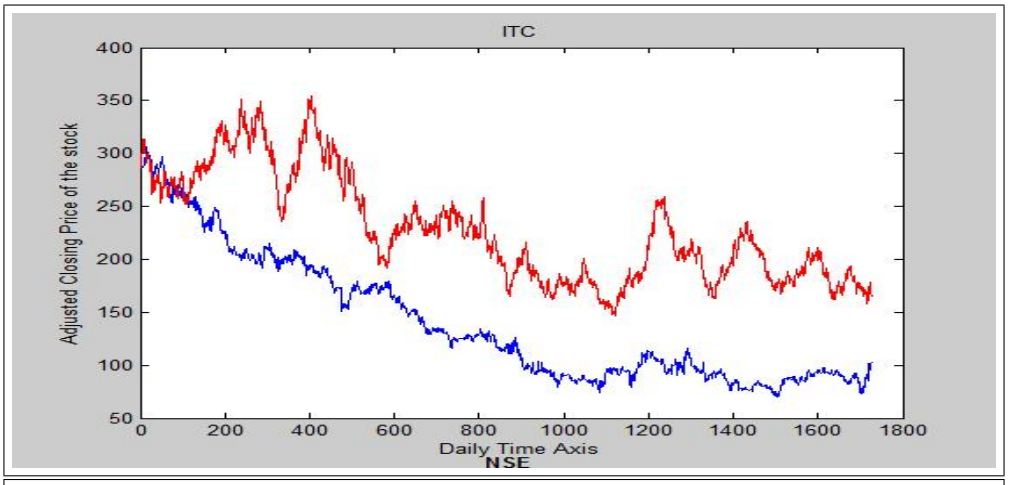

Bharti Airtel
Adjusted Closing Price of the stock
4000
3500
3000
2500
2000
1500
1000
500
0
200
400
600
800
1000
1200
1400
1600
1800
Daily Time Axis
BSE

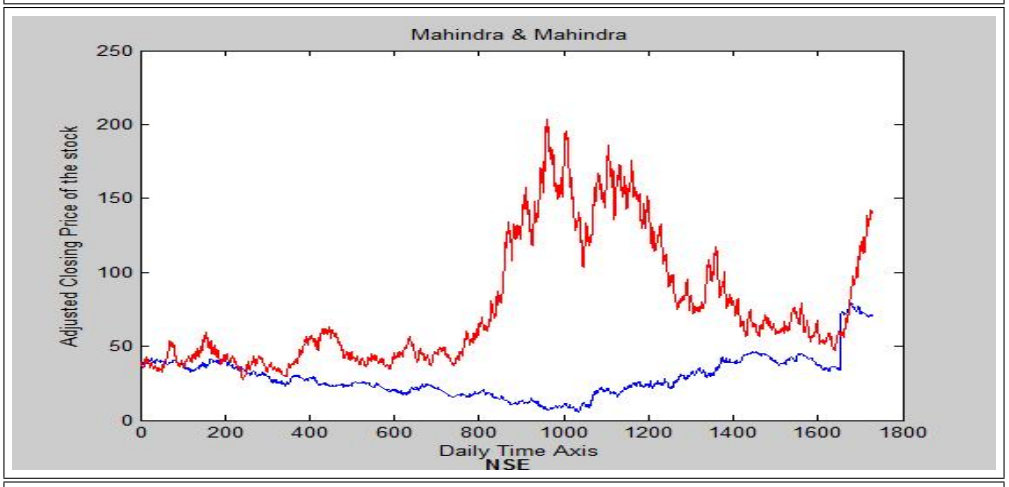

BHEL
Adjusted Closing Price of the stock
Daily Time Axis
BSE
ICICI
Adjusted Closing Price of the stock
Daily Time Axis
BSE

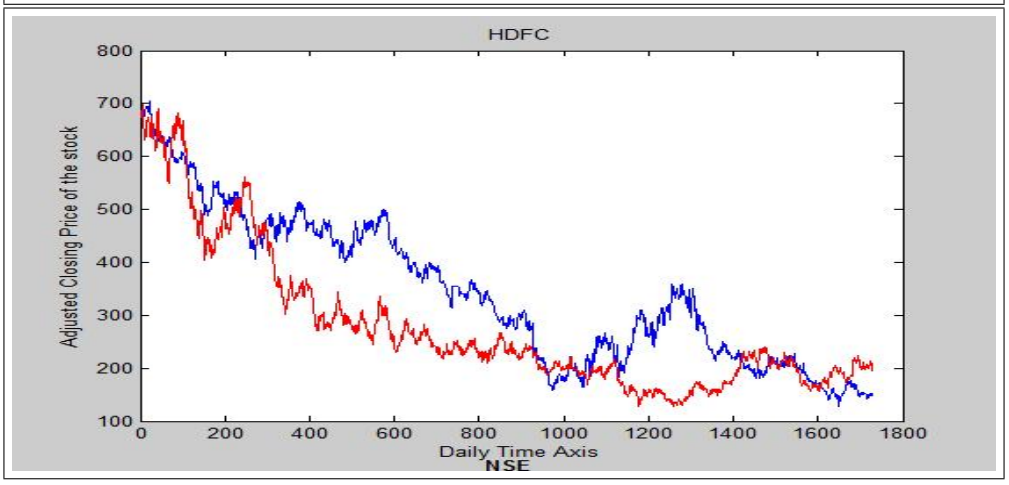
4.2 Daily Analysis of Ten Stocks using NSE

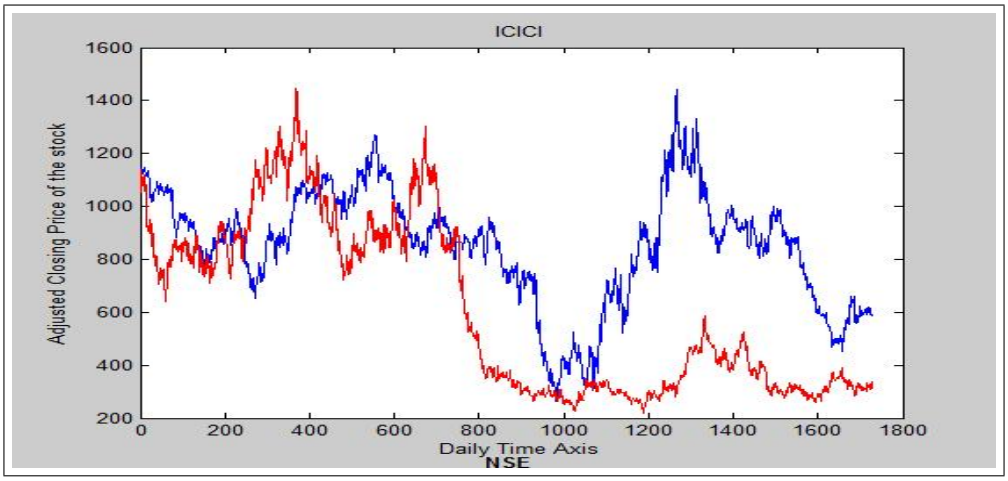



Canara Bank
Adjusted Closing Price of the stock
Daily Time Axis
NSE
Cipla
Adjusted Closing Price of the stock
Daily Time Axis
NSE
GAIL
Adjusted Closing Price of the stock
Daily Time Axis
NSE


ITC
Adjusted Closing Price of the stock
Daily Time Axis
NSE


Mahindra & Mahindra
Adjusted Closing Price of the stock
Daily Time Axis
NSE


HDFC
Adjusted Closing Price of the stock
Daily Time Axis
NSE



5 Matlab Codes

5.1 Question 1

```
close all;
clear;
clc;

[num,data] = xlsread('bsedata1.xlsx');
[n1 n2] = size(num);
n3 = floor(n1/5);
n4 = floor(n1/21);
temp1 = 5*(linspace(1,n3,n3)-1)+1;
temp2 = 21*(linspace(1,n4,n4)-1)+1;

for i = 1:n2
    figure();
    subplot(1,3,1);
    plot(num(:,i));
    xlabel('Daily Time Axis');
    ylabel('Adjusted closing price of the stock');
    subplot(1,3,2);
    plot(num(temp1,i));
    xlabel('Weekly Time Axis');
    ylabel('Adjusted closing price of the stock');
    subplot(1,3,3);
    plot(num(temp2,i));
    xlabel('Monthly Time Axis');
```

```
    ylabel('Adjusted closing price of the stock');
    ha = axes('Position',[0 0 1 1],'Xlim',[0 1],'Ylim',[0 1],'
        Box','off','Visible','off','Units','normalized', '
        clipping' , 'off');
    text(0.5, 0.99,data(i),'HorizontalAlignment','center','
        VerticalAlignment', 'top')
    text(0.5, 0.03,'\bf BSE','HorizontalAlignment','center','
        VerticalAlignment', 'top')
    f = getframe(gcf);
    imwrite(f.cdata,['BSE_' num2str(i) '.jpg']);
    close;
end

clear;
[num,data] = xlsread('nsedata1.xlsx');
[n1 n2] = size(num);
n3 = floor(n1/5);
n4 = floor(n1/21);
temp1 = 5*(linspace(1,n3,n3)-1)+1;
temp2 = 21*(linspace(1,n4,n4)-1)+1;
for i = 1:n2
    figure();
    subplot(1,3,1);
    plot(num(:,i));
    xlabel('Daily Time Axis');
    ylabel('Adjusted closing price of the stock');
    subplot(1,3,2);
    plot(num(temp1,i));
    xlabel('Weekly Time Axis');
    ylabel('Adjusted closing price of the stock');
    subplot(1,3,3);
    plot(num(temp2,i));
    xlabel('Monthly Time Axis');
    ylabel('Adjusted closing price of the stock');
    ha = axes('Position',[0 0 1 1],'Xlim',[0 1],'Ylim',[0 1],'
        Box','off','Visible','off','Units','normalized', '
        clipping' , 'off');
    text(0.5, 0.99,data(i),'HorizontalAlignment','center','
        VerticalAlignment', 'top')
    text(0.5, 0.03,'\bf NSE','HorizontalAlignment','center','
        VerticalAlignment', 'top')
    f = getframe(gcf);
    imwrite(f.cdata,['NSE_' num2str(i) '.jpg']);
```

```
    close;
end
```

5.2 Question 2

```
close all;
clear;
clc;

[num,data] = xlsread('bsedata1.xlsx');
[n1 n] = size(num);
n2 = floor(n1/5);
n3 = floor(n1/21);
temp1 = 5*(linspace(1,n2,n2)-1)+1;
temp2 = 21*(linspace(1,n3,n3)-1)+1;

for i = 1:(n1-1)
    ret1(i,:) = (num(i+1,:)-num(i,:))./num(i,:);
end
for i = 1:(n2-1)
    ret2(i,:) = (num(temp1(i+1),:)-num(temp1(i),:))./num(temp1(
        i),:);
end
for i = 1:(n3-1)
    ret3(i,:) = (num(temp2(i+1),:)-num(temp2(i),:))./num(temp2(
        i),:);
end

m = 0;
sd = 1;
ix = -3*sd:1e-3:3*sd;
iy = pdf('normal', ix, m, sd);

for i = 1:n
    figure();
    subplot(1,3,1);
    mu(i) = mean(ret1(:,i));
    sig(i) = std(ret1(:,i));
    ret1(:,i) = (ret1(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret1(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Daily data');
```

```
    subplot(1,3,2);
    mu(i) = mean(ret2(:,i));
    sig(i) = std(ret2(:,i));
    ret2(:,i) = (ret2(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret2(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Weekly data');
    subplot(1,3,3);
    mu(i) = mean(ret3(:,i));
    sig(i) = std(ret3(:,i));
    ret3(:,i) = (ret3(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret2(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Monthly data');
    ha = axes('Position',[0 0 1 1],'Xlim',[0 1],'Ylim',[0 1],'
        Box','off','Visible','off','Units','normalized', '
        clipping' , 'off');
    text(0.5, 1, data(i),'HorizontalAlignment','center','
        VerticalAlignment', 'top')
    text(0.5, 0.03,'\bf BSE','HorizontalAlignment','center','
        VerticalAlignment', 'top')
    f = getframe(gcf);
    imwrite(f.cdata,['BSE_' num2str(i) '.jpg']);
    close;
end

clear;
clc;

[num,data] = xlsread('nsedata1.xlsx');
[n1 n] = size(num);
n2 = floor(n1/5);
n3 = floor(n1/21);
temp1 = 5*(linspace(1,n2,n2)-1)+1;
temp2 = 21*(linspace(1,n3,n3)-1)+1;

for i = 1:(n1-1)
    ret1(i,:) = (num(i+1,:)-num(i,:))./num(i,:);
end
```

```
for i = 1:(n2-1)
    ret2(i,:) = (num(temp1(i+1),:)-num(temp1(i),:))./num(temp1(
        i),:);
end
for i = 1:(n3-1)
    ret3(i,:) = (num(temp2(i+1),:)-num(temp2(i),:))./num(temp2(
        i),:);
end

m = 0;
sd = 1;
ix = -3*sd:1e-3:3*sd;
iy = pdf('normal', ix, m, sd);

for i = 1:n
    figure();
    subplot(1,3,1);
    mu(i) = mean(ret1(:,i));
    sig(i) = std(ret1(:,i));
    ret1(:,i) = (ret1(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret1(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Daily data');
    subplot(1,3,2);
    mu(i) = mean(ret2(:,i));
    sig(i) = std(ret2(:,i));
    ret2(:,i) = (ret2(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret2(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Weekly data');
    subplot(1,3,3);
    mu(i) = mean(ret3(:,i));
    sig(i) = std(ret3(:,i));
    ret3(:,i) = (ret3(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret2(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Monthly data');
```

```
    ha = axes('Position',[0 0 1 1],'Xlim',[0 1],'Ylim',[0 1],'
        Box','off','Visible','off','Units','normalized', '
        clipping' , 'off');
    text(0.5, 1, data(i),'HorizontalAlignment','center','
        VerticalAlignment', 'top')
    text(0.5, 0.03,'\bf NSE','HorizontalAlignment','center','
        VerticalAlignment', 'top')
    f = getframe(gcf);
    imwrite(f.cdata,['NSE_' num2str(i) '.jpg']);
    close;
end
```

5.3 Question 3

```
close all;
clear;
clc;

[num,data] = xlsread('bsedata1.xlsx');
[n1 n] = size(num);
n2 = floor(n1/5);
n3 = floor(n1/21);
temp1 = 5*(linspace(1,n2,n2)-1)+1;
temp2 = 21*(linspace(1,n3,n3)-1)+1;

for i = 1:(n1-1)
    ret1(i,:) = log(num(i+1,:)./num(i,:));
end
for i = 1:(n2-1)
    ret2(i,:) = log(num(temp1(i+1),:)./num(temp1(i),:));
end
for i = 1:(n3-1)
    ret3(i,:) = log(num(temp2(i+1),:)./num(temp2(i),:));
end

m = 0;
sd = 1;
ix = -3*sd:1e-3:3*sd;
iy = pdf('normal', ix, m, sd);

for i = 1:n
    figure();
    subplot(1,3,1);
    mu(i) = mean(ret1(:,i));
```

```
    sig(i) = std(ret1(:,i));
    ret1(:,i) = (ret1(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret1(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Daily data');
    subplot(1,3,2);
    mu(i) = mean(ret2(:,i));
    sig(i) = std(ret2(:,i));
    ret2(:,i) = (ret2(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret2(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Weekly data');
    subplot(1,3,3);
    mu(i) = mean(ret3(:,i));
    sig(i) = std(ret3(:,i));
    ret3(:,i) = (ret3(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret2(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Monthly data');
    ha = axes('Position',[0 0 1 1],'Xlim',[0 1],'Ylim',[0 1],'
        Box','off','Visible','off','Units','normalized', '
        clipping' , 'off');
    text(0.5, 1, data(i),'HorizontalAlignment','center','
        VerticalAlignment', 'top')
    text(0.5, 0.03,'\bf BSE','HorizontalAlignment','center','
        VerticalAlignment', 'top')
    f = getframe(gcf);
    imwrite(f.cdata,['BSE_' num2str(i) '.jpg']);
    close;
end

clear;
clc;

[num,data] = xlsread('nsedata1.xlsx');
[n1 n] = size(num);
n2 = floor(n1/5);
```

```
n3 = floor(n1/21);
temp1 = 5*(linspace(1,n2,n2)-1)+1;
temp2 = 21*(linspace(1,n3,n3)-1)+1;

for i = 1:(n1-1)
    ret1(i,:) = log(num(i+1,:)./num(i,:));
end
for i = 1:(n2-1)
    ret2(i,:) = log(num(temp1(i+1),:)./num(temp1(i),:));
end
for i = 1:(n3-1)
    ret3(i,:) = log(num(temp2(i+1),:)./num(temp2(i),:));
end

m = 0;
sd = 1;
ix = -3*sd:1e-3:3*sd;
iy = pdf('normal', ix, m, sd);

for i = 1:n
    figure();
    subplot(1,3,1);
    mu(i) = mean(ret1(:,i));
    sig(i) = std(ret1(:,i));
    ret1(:,i) = (ret1(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret1(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Daily data');
    subplot(1,3,2);
    mu(i) = mean(ret2(:,i));
    sig(i) = std(ret2(:,i));
    ret2(:,i) = (ret2(:,i)-mu(i))/sig(i);
    [nn,xout] = hist(ret2(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Weekly data');
    subplot(1,3,3);
    mu(i) = mean(ret3(:,i));
    sig(i) = std(ret3(:,i));
    ret3(:,i) = (ret3(:,i)-mu(i))/sig(i);
```

```
    [nn,xout] = hist(ret2(:,i),20);
    bar(xout,nn/sum(nn));
    hold on;
    plot(ix,iy,'red');
    title('Monthly data');
    ha = axes('Position',[0 0 1 1],'Xlim',[0 1],'Ylim',[0 1],'
        Box','off','Visible','off','Units','normalized', '
        clipping' , 'off');
    text(0.5, 1, data(i),'HorizontalAlignment','center','
        VerticalAlignment', 'top')
    text(0.5, 0.03,'\bf NSE','HorizontalAlignment','center','
        VerticalAlignment', 'top')
    f = getframe(gcf);
    imwrite(f.cdata,['NSE_' num2str(i) '.jpg']);
    close;
end
```

5.4 Question 4

```
close all;
clear;
clc;

[num1,data] = xlsread('bsedata1.xlsx');
[n1 n] = size(num1);

for i = 1:(n1-1)
    ret1(i,:) = log(num1(i+1,:)./num1(i,:));
end

for i = 1:n
    mu(i) = mean(ret1(:,i));
    sig(i) = std(ret1(:,i));
    ret1(:,i) = mu(i)+sig(i)*randn(n1-1,1);
end

num2(1,:) = num1(1,:);
for i = 1:n1-1
    num2(i+1,:) = num2(i,:).*exp(ret1(i,:));
end

for i = 1:n
    figure();
    plot(num1(:,i));
```

```
    hold on;
    plot(num2(:,i),'red');
    ylabel('Adjusted Closing Price of the stock');
    xlabel('Daily Time Axis');
    title(data(i));
    ha = axes('Position',[0 0 1 1],'Xlim',[0 1],'Ylim',[0 1],'
        Box','off','Visible','off','Units','normalized', '
        clipping' , 'off');
    text(0.5, 0.03,'\bf BSE','HorizontalAlignment','center','
        VerticalAlignment', 'top')
    f = getframe(gcf);
    imwrite(f.cdata,['BSE_' num2str(i) '.jpg']);
    close;
end

clear;
clc;

[num1,data] = xlsread('nsedata1.xlsx');
[n1 n] = size(num1);

for i = 1:(n1-1)
    ret1(i,:) = log(num1(i+1,:)./num1(i,:));
end

for i = 1:n
    mu(i) = mean(ret1(:,i));
    sig(i) = std(ret1(:,i));
    ret1(:,i) = mu(i)+sig(i)*randn(n1-1,1);
end

num2(1,:) = num1(1,:);
for i = 1:n1-1
    num2(i+1,:) = num2(i,:).*exp(ret1(i,:));
end

for i = 1:n
    figure();
    plot(num1(:,i));
    hold on;
    plot(num2(:,i),'red');
    ylabel('Adjusted Closing Price of the stock');
    xlabel('Daily Time Axis');
```

```
    title(data(i));
    ha = axes('Position',[0 0 1 1],'Xlim',[0 1],'Ylim',[0 1],'
        Box','off','Visible','off','Units','normalized', '
        clipping' , 'off');
    text(0.5, 0.03,'\bf NSE','HorizontalAlignment','center','
        VerticalAlignment', 'top')
    f = getframe(gcf);
    imwrite(f.cdata,['NSE_' num2str(i) '.jpg']);
    close;
end
```

6 References

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- http://www.calculatinginvestor.com/2011/06/07/efficient-frontier-1/...