Econometrics_2021

JCA

Last edited 2021-03-26

Contents

```
# PROBLEM SET 2 (UNIGE- 2021)
# Exercice 2 (2021)

# You first need to load the library
library(ggplot2)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

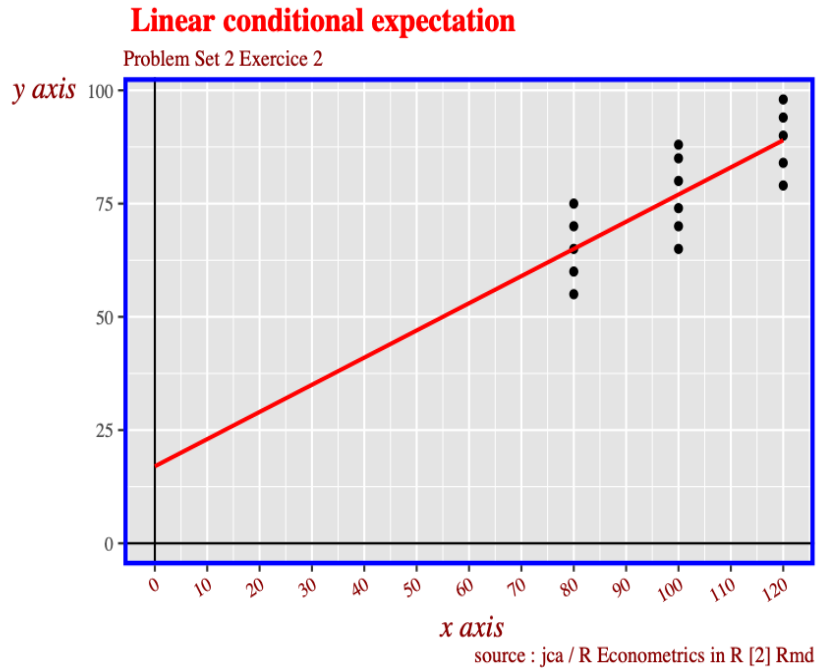
```
library(knitr)
```

```
## Warning: package 'knitr' was built under R version 3.4.1
```

```
# Then the data from table 2
A1<-c(55,60,65,70,75,65,70,74,80,85,88,79,84,90,94,98)
A2<- c(80,80,80,80,80,100,100,100,100,100,100,120,120,120,120,120)

A12<-cbind(A1, A2)
A12<-as.data.frame(A12);A12
```

```
##    A1  A2
## 1  55  80
## 2  60  80
## 3  65  80
## 4  70  80
## 5  75  80
## 6  65 100
## 7  70 100
## 8  74 100
## 9  80 100
## 10 85 100
## 11 88 100
## 12 79 120
## 13 84 120
## 14 90 120
## 15 94 120
## 16 98 120
```

```r
ylce<-function(x){
        y<-3/5*x+17
}

# Now the picture

ggplot(aes(x= A2, y = A1), data = A12)+
        geom_point()+
        labs(x =" x axis", y=" y axis",
     title = " Linear conditional expectation ",
     subtitle="Problem Set 2 Exercice 2",

     caption = "source : jca / R Econometrics in R [2] Rmd")+
         theme(plot.title = element_text(colour = "red", size = 20, face = "bold"))+
        theme(axis.text.x=element_text(angle=30, vjust=1, hjust=1, family="serif", colour ="darkred"))+
        theme(text=element_text(family="serif",
        colour ="darkred"), axis.title = element_text(siz=(11)),
        panel.background=element_rect(fill="grey90"))+
                  theme(plot.title = element_text(face = "bold",
                size = 15))+
        theme (axis.title.y=element_text(angle=0,
        face ="italic", colour = "darkred", size = 14),axis.title.x=element_text(angle=0,
        face ="italic",
        colour = "darkred", size = 14))+
        theme(plot.margin = unit(c(5,10,5,10), units ="mm"))+
        theme(panel.border= element_rect(colour = "blue",size = 2, fill=NA))+
           geom_hline(yintercept=0, size = 0.5)+
        geom_vline(xintercept=0, size = 0.5)+
        stat_function(fun= ylce, col="red", size =.9)+
         scale_x_continuous(breaks= seq(0, 125,10))
```




```
# To compute the mean, you first have to select the observations 1, 2 and 3

OB1<-A12%>%filter(A2==80);OB1
```

```
##   A1 A2
## 1 55 80
## 2 60 80
## 3 65 80
## 4 70 80
## 5 75 80
```

```
OB2<-A12%>%filter(A2==100);OB2
```

```
##   A1  A2
## 1 65 100
## 2 70 100
## 3 74 100
## 4 80 100
## 5 85 100
## 6 88 100
```

```
OB3<-A12%>%filter(A2==120);OB3
```

```
##   A1  A2
## 1 79 120
## 2 84 120
## 3 90 120
## 4 94 120
## 5 98 120
```

```r
# Here is 3 ways to get the mean
mean(OB1$A1)
```

```
## [1] 65
```

```r
mean(OB1[,1])
```

```
## [1] 65
```

```r
summary(OB1)
```

```
##        A1           A2
##  Min.   :55   Min.   :80
##  1st Qu.:60   1st Qu.:80
##  Median :65   Median :80
##  Mean   :65   Mean   :80
##  3rd Qu.:70   3rd Qu.:80
##  Max.   :75   Max.   :80
```

```r
# We may do the same for OB2 and OB3

mean(OB2$A1)
```

```
## [1] 77
```

```r
mean(OB2[,1])
```

```
## [1] 77
```

```r
summary(OB2)
```

```
##        A1              A2
##  Min.   :65.00   Min.   :100
##  1st Qu.:71.00   1st Qu.:100
##  Median :77.00   Median :100
##  Mean   :77.00   Mean   :100
##  3rd Qu.:83.75   3rd Qu.:100
##  Max.   :88.00   Max.   :100
```

```r
mean(OB3$A1)
```

```
## [1] 89
```

```r
mean(OB3[,1])
```

```
## [1] 89
```

```r
summary(OB3)
```

```
##        A1           A2
##  Min.   :79   Min.   :120
##  1st Qu.:84   1st Qu.:120
##  Median :90   Median :120
##  Mean   :89   Mean   :120
##  3rd Qu.:94   3rd Qu.:120
##  Max.   :98   Max.   :120
```

```r
# To get the variance, there is a function : var().
# But this function give you the variance divided by (n-1) where n is the number of observations.
var(OB1$A1)
```

```
## [1] 62.5
```

```
# To get the usual variance, you have to divide the resusalt by n and multiply by (n-1).

# First compute n
n<- nrow(OB1)

var(OB1$A1)*(n-1)/n
```

```
## [1] 50
```

```
# And you get the expected value of 50.


# For the other observations

n2<- nrow(OB2)

var(OB2$A1)*(n2-1)/n2
```

```
## [1] 66
```

```
n3<- nrow(OB3)

var(OB3$A1)*(n3-1)/n3
```

```
## [1] 46.4
```

```
# The sd() function gives the standart deviation with the same correction...so the sqrt((n-1)/n)

sd(OB1$A1)*sqrt((n-1)/n)
```

```
## [1] 7.071068
```

```
sd(OB2$A1)*sqrt((n2-1)/n2)
```

```
## [1] 8.124038
```

```
sd(OB3$A1)*sqrt((n3-1)/n3)
```

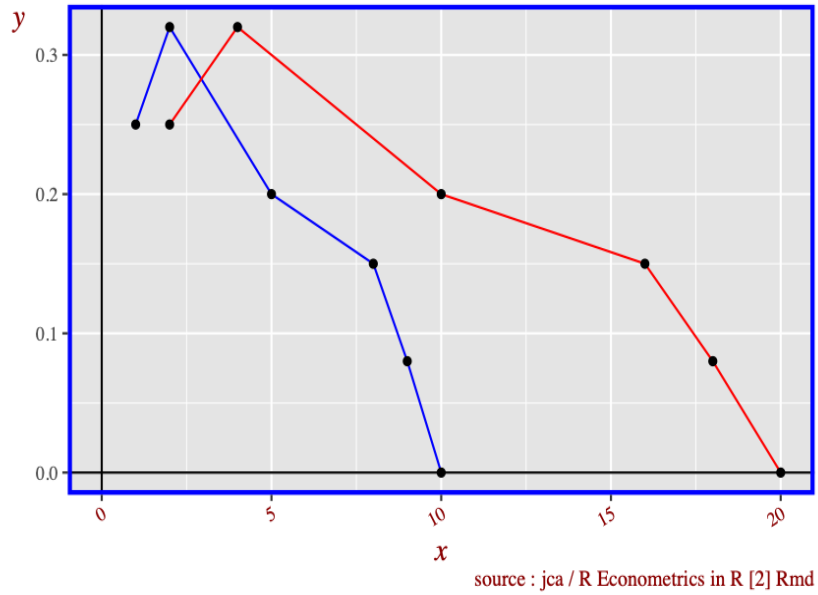
```
## [1] 6.811755
```

```
#  PROBLEM SET 3 (UNIGE- 2021)
#  Exercice 3
#  Quetion 4


ECO1<-ggplot(data.frame(x=c(0,20)), aes(x=x))


ECO1+
              labs(x ="x", y=" y",
     title = " Probability ",
     subtitle="Problem Set 2 Exercice 3, Question 4",

     caption = "source : jca / R Econometrics in R [2] Rmd")+
         theme(plot.title = element_text(colour = "red", size = 20, face = "bold"))+
        theme(axis.text.x=element_text(angle=30, vjust=1, hjust=1, family="serif", colour ="darkred"))+
        theme(text=element_text(family="serif",
```

```
        colour ="darkred"),
        axis.title = element_text(siz=(11)),
        panel.background=element_rect(fill="grey90"))+
theme(plot.title = element_text(face = "bold", size = 15))+
        theme (axis.title.y=element_text(angle=0,
        face ="italic", colour = "darkred",
        size = 14),axis.title.x=element_text(angle=0,
face ="italic", colour = "darkred", size = 14))+
        theme(plot.margin = unit(c(5,10,5,10), units ="mm"))+
        theme(panel.border= element_rect(colour = "blue",size = 2, fill=NA))+
        geom_hline(yintercept=0, size = 0.5)+
        geom_vline(xintercept=0, size = 0.5)+
        annotate("segment", x=c(1,2,5,8,9),xend=c(2,5,8,9,10),
        y= c(0.25,0.32,0.2,0.15,0.08),
        yend= c( 0.32, 0.2,0.15,0.08,0), col="blue")+
        annotate("segment", x=c(2,4,10,16,18),
        xend=c(4,10,16,18,20), y= c(0.25,0.32,0.2,0.15,0.08),
        yend= c( 0.32, 0.2,0.15,0.08,0), col="red") +
        annotate("point", x= c(1,2,5,8,9,10),
        y= c(0.25,0.32,0.2,0.15,0.08, 0))+
        annotate("point", x= 2*c(1,2,5,8,9,10),
        y= c(0.25,0.32,0.2,0.15,0.08, 0))
```

Probability

Problem Set 2 Exercice 3, Question 4



source : jca / R Econometrics in R [2] Rmd

```
# Problem Set 4 UNIGE
#  Exercice 2 ( 2021 )


t1<-c(1,2,3,4,5,6,7,8,9,10,11)
```

```r
t2<-c(1,4,4,11,6,10,5,2,5,5,2)
t3<-c(2,5,6,15,5,12,6,3,5,6,1)

SET42<-cbind(t1, t2, t3)
SET42<-as.data.frame(SET42);SET42
```

```
##    t1 t2 t3
## 1   1  1  2
## 2   2  4  5
## 3   3  4  6
## 4   4 11 15
## 5   5  6  5
## 6   6 10 12
## 7   7  5  6
## 8   8  2  3
## 9   9  5  5
## 10 10  5  6
## 11 11  2  1
```

```r
names(SET42)<- c("i","x","y")

SET42
```

```
##     i  x  y
## 1   1  1  2
## 2   2  4  5
## 3   3  4  6
## 4   4 11 15
## 5   5  6  5
## 6   6 10 12
## 7   7  5  6
## 8   8  2  3
## 9   9  5  5
## 10 10  5  6
## 11 11  2  1
```

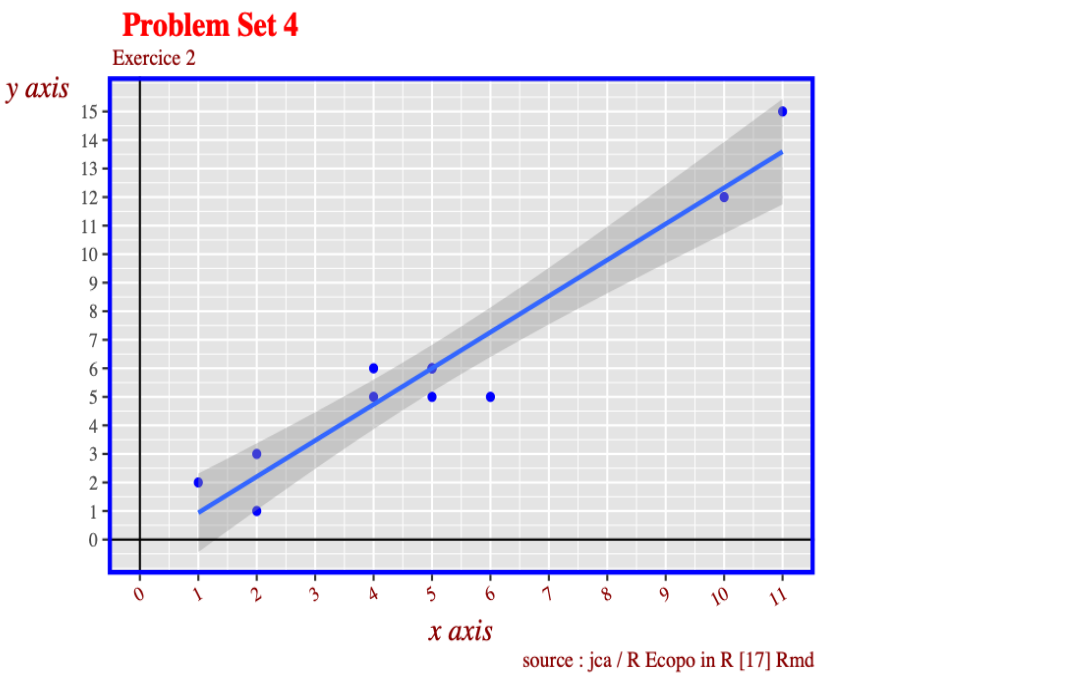
```r
summary(SET42)
```

```
##        i              x              y
##  Min.   : 1.0   Min.   : 1.0   Min.   : 1
##  1st Qu.: 3.5   1st Qu.: 3.0   1st Qu.: 4
##  Median : 6.0   Median : 5.0   Median : 5
##  Mean   : 6.0   Mean   : 5.0   Mean   : 6
##  3rd Qu.: 8.5   3rd Qu.: 5.5   3rd Qu.: 6
##  Max.   :11.0   Max.   :11.0   Max.   :15
```

```r
ResultSET42<- lm(SET42$y ~SET42$x, data = SET42); ResultSET42
```

```
##
## Call:
## lm(formula = SET42$y ~ SET42$x, data = SET42)
##
## Coefficients:
## (Intercept)      SET42$x
##     -0.3265       1.2653
```

```r
ggplot(ResultSET42, aes(x= SET42$x, y=SET42$y))+
        geom_point(col="blue")+
        geom_smooth(method = "lm")+
          labs(x ="x axis", y="y axis",
     title = "  Problem Set 4 ",
     subtitle=" Exercice 2 ",
     caption = "source : jca / R Ecopo in R [17] Rmd")+
         theme(plot.title = element_text(colour = "red", size = 20, face = "bold"))+
        theme(axis.text.x=element_text(angle=30, vjust=1, hjust=1, family="serif", colour ="darkred"))+
        theme(text=element_text(family="serif",  colour ="darkred"), axis.title = element_text(siz=(11)
                  theme(plot.title = element_text(face = "bold", size = 15))+
        theme (axis.title.y=element_text(angle=0, face ="italic", colour = "darkred", size = 14),axis.t
        theme(plot.margin = unit(c(5,10,5,10), units ="mm"))+
        theme(panel.border= element_rect(colour = "blue",size = 2, fill=NA))+
        geom_hline(yintercept=0, size = 0.5)+
        geom_vline(xintercept=0, size = 0.5)+
          scale_x_continuous(breaks= seq(0, 11,1))+
         scale_y_continuous(breaks= seq(0, 15,1))
```




```r
summary(ResultSET42)
```

```
##
## Call:
## lm(formula = SET42$y ~ SET42$x, data = SET42)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.2653 -0.6633  0.0000  0.9286  1.4082
```

```
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  -0.3265     0.7097   -0.46    0.656
## SET42$x       1.2653     0.1219   10.38 2.62e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.207 on 9 degrees of freedom
## Multiple R-squared:  0.9229, Adjusted R-squared:  0.9144
## F-statistic: 107.8 on 1 and 9 DF,  p-value: 2.618e-06
```

```
RSS = 1.207
R_squared = 0.92
TSS = RSS/(1-R_squared); TSS
```

```
## [1] 15.0875
```

```
ESS = TSS-RSS; ESS
```

```
## [1] 13.8805
```

```
1-RSS/TSS
```

```
## [1] 0.92
```

```
K1<-rbind(c(1.207,0.92, 15.0875, 13.8805 ))
K1<-as.data.frame(K1)
names(K1)<-c("RRS", "R-squared","TSS", "ESS")
kable(K1, caption = 'Statistical Results')
```

Table 1: Statistical Results

RRS	R-squared	TSS	ESS
1.207	0.92	15.0875	13.8805