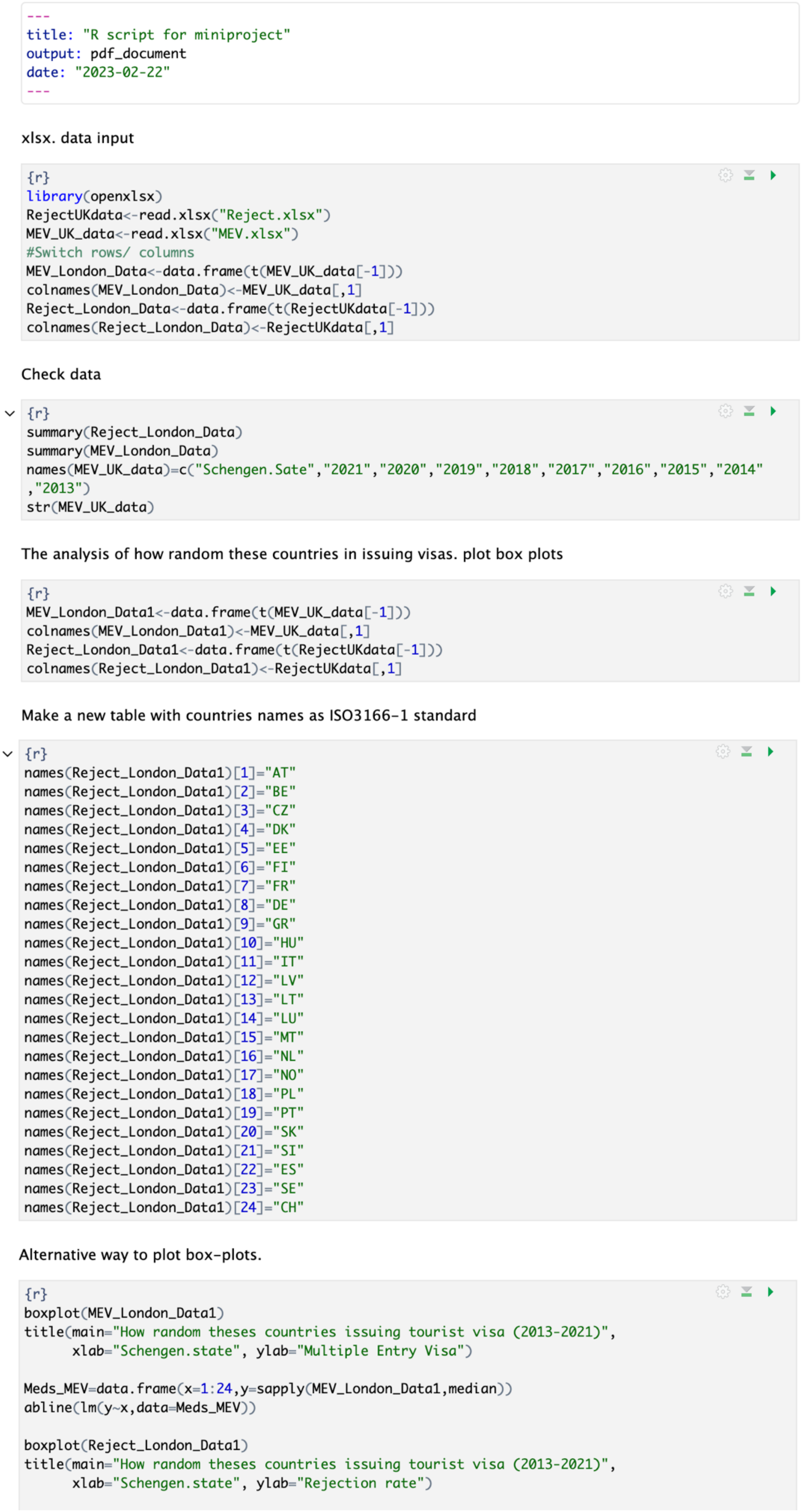


```
---
title: "R script for miniproject"
output: pdf_document
date: "2023-02-22"
---
```

xlsx. data input

```
{r}
library(openxlsx)
RejectUKdata<-read.xlsx("Reject.xlsx")
MEV_UK_data<-read.xlsx("MEV.xlsx")
#Switch rows/ columns
MEV_London_Data<-data.frame(t(MEV_UK_data[-1]))
colnames(MEV_London_Data)<-MEV_UK_data[,1]
Reject_London_Data<-data.frame(t(RejectUKdata[-1]))
colnames(Reject_London_Data)<-RejectUKdata[,1]
```

Check data

```
{r}
summary(Reject_London_Data)
summary(MEV_London_Data)
names(MEV_UK_data)=c("Schengen.Sate","2021","2020","2019","2018","2017","2016","2015","2014"
,"2013")
str(MEV_UK_data)
```

The analysis of how random these countries in issuing visas. plot box plots

```
{r}
MEV_London_Data1<-data.frame(t(MEV_UK_data[-1]))
colnames(MEV_London_Data1)<-MEV_UK_data[,1]
Reject_London_Data1<-data.frame(t(RejectUKdata[-1]))
colnames(Reject_London_Data1)<-RejectUKdata[,1]
```

Make a new table with countries names as ISO3166-1 standard

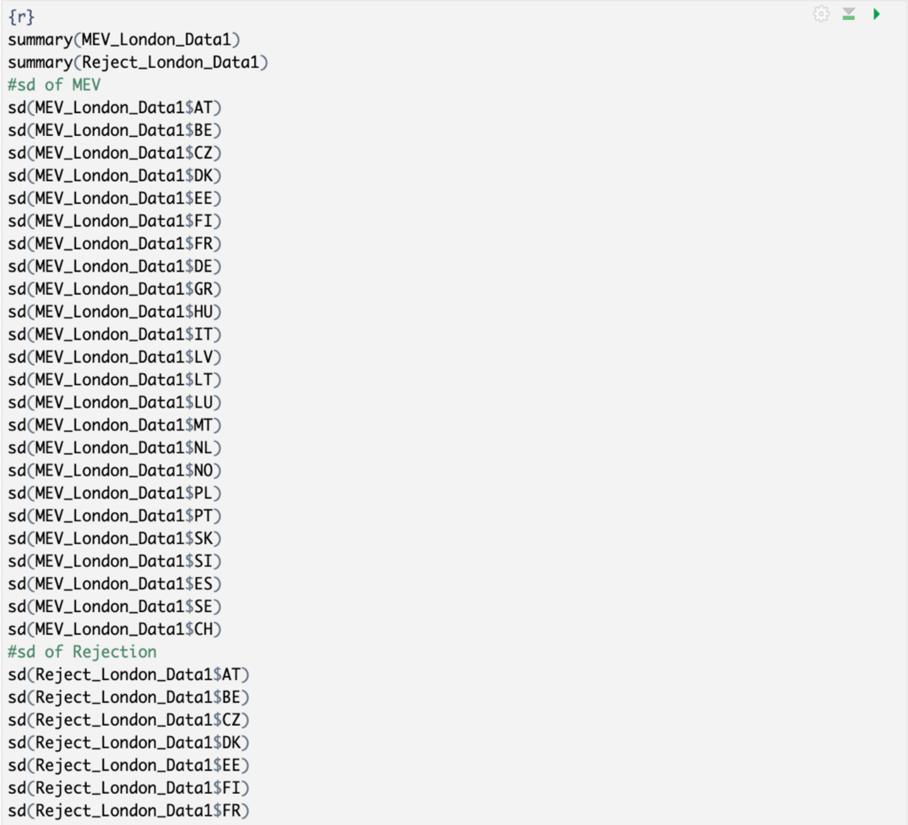
```
{r}
names(Reject_London_Data1)[1]="AT"
names(Reject_London_Data1)[2]="BE"
names(Reject_London_Data1)[3]="CZ"
names(Reject_London_Data1)[4]="DK"
names(Reject_London_Data1)[5]="EE"
names(Reject_London_Data1)[6]="FI"
names(Reject_London_Data1)[7]="FR"
names(Reject_London_Data1)[8]="DE"
names(Reject_London_Data1)[9]="GR"
names(Reject_London_Data1)[10]="HU"
names(Reject_London_Data1)[11]="IT"
names(Reject_London_Data1)[12]="LV"
names(Reject_London_Data1)[13]="LT"
names(Reject_London_Data1)[14]="LU"
names(Reject_London_Data1)[15]="MT"
names(Reject_London_Data1)[16]="NL"
names(Reject_London_Data1)[17]="NO"
names(Reject_London_Data1)[18]="PL"
names(Reject_London_Data1)[19]="PT"
names(Reject_London_Data1)[20]="SK"
names(Reject_London_Data1)[21]="SI"
names(Reject_London_Data1)[22]="ES"
names(Reject_London_Data1)[23]="SE"
names(Reject_London_Data1)[24]="CH"
```

Alternative way to plot box-plots.

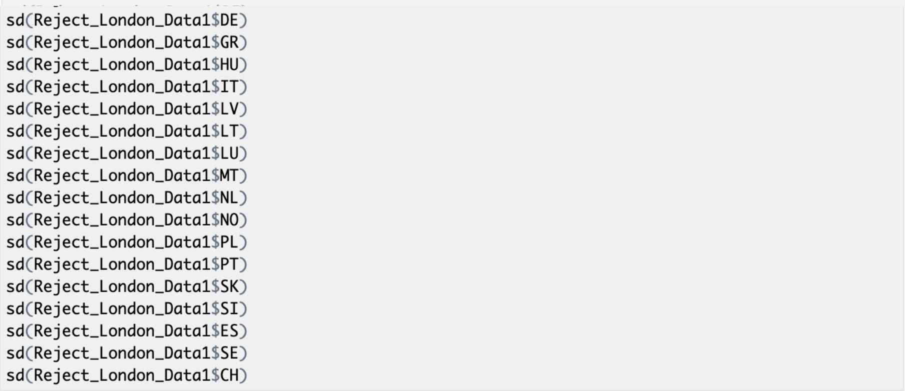
```
{r}
boxplot(MEV_London_Data1)
title(main="How random theses countries issuing tourist visa (2013-2021)",
      xlab="Schengen.state", ylab="Multiple Entry Visa")

Meds_MEV=data.frame(x=1:24,y=sapply(MEV_London_Data1,median))
abline(lm(y~x,data=Meds_MEV))

boxplot(Reject_London_Data1)
title(main="How random theses countries issuing tourist visa (2013-2021)",
      xlab="Schengen.state", ylab="Rejection rate")
```

```
Meds_Reject=data.frame(x=1:24,y=sapply(Reject_London_Data1,median))
abline(lm(y~x,data=Meds_Reject))
```

Get an overview of how disperse the data is:



```
{r}
summary(MEV_London_Data1)
summary(Reject_London_Data1)
#sd of MEV
sd(MEV_London_Data1$AT)
sd(MEV_London_Data1$BE)
sd(MEV_London_Data1$CZ)
sd(MEV_London_Data1$DK)
sd(MEV_London_Data1$EE)
sd(MEV_London_Data1$FI)
sd(MEV_London_Data1$FR)
sd(MEV_London_Data1$DE)
sd(MEV_London_Data1$GR)
sd(MEV_London_Data1$HU)
sd(MEV_London_Data1$IT)
sd(MEV_London_Data1$LV)
sd(MEV_London_Data1$LT)
sd(MEV_London_Data1$LU)
sd(MEV_London_Data1$MT)
sd(MEV_London_Data1$NL)
sd(MEV_London_Data1$NO)
sd(MEV_London_Data1$PL)
sd(MEV_London_Data1$PT)
sd(MEV_London_Data1$SK)
sd(MEV_London_Data1$SI)
sd(MEV_London_Data1$ES)
sd(MEV_London_Data1$SE)
sd(MEV_London_Data1$CH)
#sd of Rejection
sd(Reject_London_Data1$AT)
sd(Reject_London_Data1$BE)
sd(Reject_London_Data1$CZ)
sd(Reject_London_Data1$DK)
sd(Reject_London_Data1$EE)
sd(Reject_London_Data1$FI)
sd(Reject_London_Data1$FR)
```



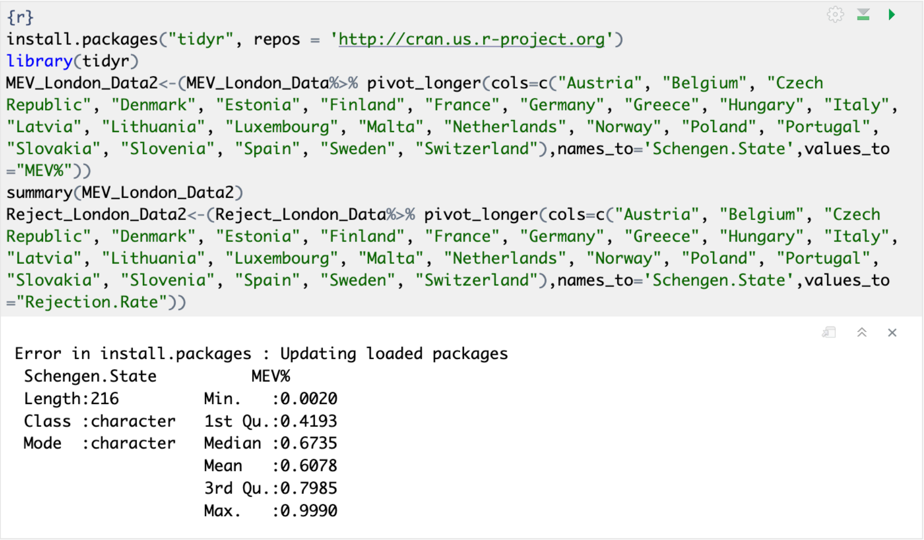
```
sd(Reject_London_Data1$DE)
sd(Reject_London_Data1$GR)
sd(Reject_London_Data1$HU)
sd(Reject_London_Data1$IT)
sd(Reject_London_Data1$LV)
sd(Reject_London_Data1$LT)
sd(Reject_London_Data1$LU)
sd(Reject_London_Data1$MT)
sd(Reject_London_Data1$NL)
sd(Reject_London_Data1$NO)
sd(Reject_London_Data1$PL)
sd(Reject_London_Data1$PT)
sd(Reject_London_Data1$SK)
sd(Reject_London_Data1$SI)
sd(Reject_London_Data1$ES)
sd(Reject_London_Data1$SE)
sd(Reject_London_Data1$CH)
```

Make a table summariing all standard deviations

```
{r}
y1=c(sd(MEV_London_Data1$AT),sd(MEV_London_Data1$BE),sd(MEV_London_Data1$CZ),sd
(MEV_London_Data1$DK),sd(MEV_London_Data1$EE),sd(MEV_London_Data1$FI),sd(MEV_London_Data1$FR
),sd(MEV_London_Data1$DE),sd(MEV_London_Data1$GR),sd(MEV_London_Data1$HU),sd
(MEV_London_Data1$IT),sd(MEV_London_Data1$LV),sd(MEV_London_Data1$LT),sd(MEV_London_Data1$LU
),sd(MEV_London_Data1$MT),sd(MEV_London_Data1$NL),sd(MEV_London_Data1$NO),sd
(MEV_London_Data1$PL),sd(MEV_London_Data1$PT),sd(MEV_London_Data1$SK),sd(MEV_London_Data1$SI
),sd(MEV_London_Data1$ES),sd(MEV_London_Data1$SE),sd(MEV_London_Data1$CH))
x<-c("AT","BE","CZ","DK","EE","FI","FR","DE","GR","HU","IT","LV","LT","LU","MT","NL","NO","PL"
,"PT","SK","SI","ES","SE","CH")
y2=c(sd(Reject_London_Data1$AT),sd(Reject_London_Data1$BE),sd(Reject_London_Data1$CZ),sd
(Reject_London_Data1$DK),sd(Reject_London_Data1$EE),sd(Reject_London_Data1$FI),sd
(Reject_London_Data1$FR),sd(Reject_London_Data1$DE),sd(Reject_London_Data1$GR),sd
(Reject_London_Data1$HU),sd(Reject_London_Data1$IT),sd(Reject_London_Data1$LV),sd
(Reject_London_Data1$LT),sd(Reject_London_Data1$LU),sd(Reject_London_Data1$MT),sd
(Reject_London_Data1$NL),sd(Reject_London_Data1$NO),sd(Reject_London_Data1$PL),sd
(Reject_London_Data1$PT),sd(Reject_London_Data1$SK),sd(Reject_London_Data1$SI),sd
(Reject_London_Data1$ES),sd(Reject_London_Data1$SE),sd(Reject_London_Data1$CH))
df1<-data.frame(x,y1)
df2<-data.frame(x,y2)
df3<-df2<-data.frame(x,y1,y2)
str(df3)
```

```
#Four countries that most likely to issue MEV: LV,BE,EE,SE,(PT)!!!
#Four countries that least likely to issue MEV: ES,NL,DE,AT,(SK)
#Four countries that most likely to reject visa: NO,BE,FR,FI,(LV)
#Four countries that least likely to reject visa:CH,PL,DE,SE,(PT)
```

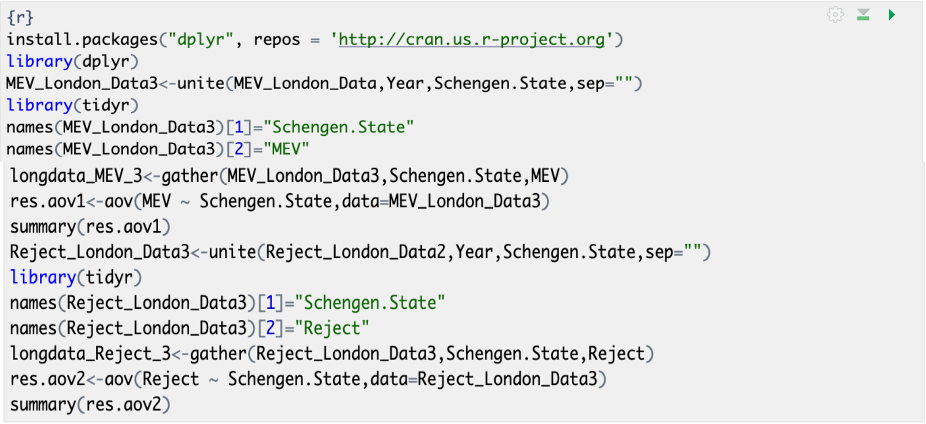
the attempt to run a lm model and ANOVA in data.frame, first let's prapare the data.



```
{r}
install.packages("tidyr", repos = 'http://cran.us.r-project.org')
library(tidyr)
MEV_London_Data2<-(MEV_London_Data%>% pivot_longer(cols=c("Austria", "Belgium", "Czech
Republic", "Denmark", "Estonia", "Finland", "France", "Germany", "Greece", "Hungary", "Italy",
"Latvia", "Lithuania", "Luxembourg", "Malta", "Netherlands", "Norway", "Poland", "Portugal",
"Slovakia", "Slovenia", "Spain", "Sweden", "Switzerland"),names_to='Schengen.State',values_to
="MEV%"))
summary(MEV_London_Data2)
Reject_London_Data2<-(Reject_London_Data%>% pivot_longer(cols=c("Austria", "Belgium", "Czech
Republic", "Denmark", "Estonia", "Finland", "France", "Germany", "Greece", "Hungary", "Italy",
"Latvia", "Lithuania", "Luxembourg", "Malta", "Netherlands", "Norway", "Poland", "Portugal",
"Slovakia", "Slovenia", "Spain", "Sweden", "Switzerland"),names_to='Schengen.State',values_to
="Rejection.Rate"))
```

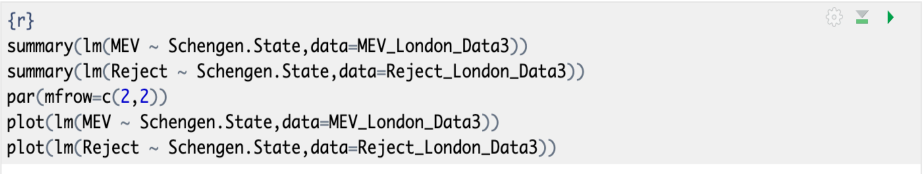
```
Error in install.packages : Updating loaded packages
 Schengen.State          MEV%       
 Length:216         Min.   :0.0020  
 Class :character   1st Qu.:0.4193  
 Mode  :character   Median :0.6735  
                    Mean   :0.6078  
                    3rd Qu.:0.7985  
                    Max.   :0.9990  
```

Anova in data frame.MEV and Rejection

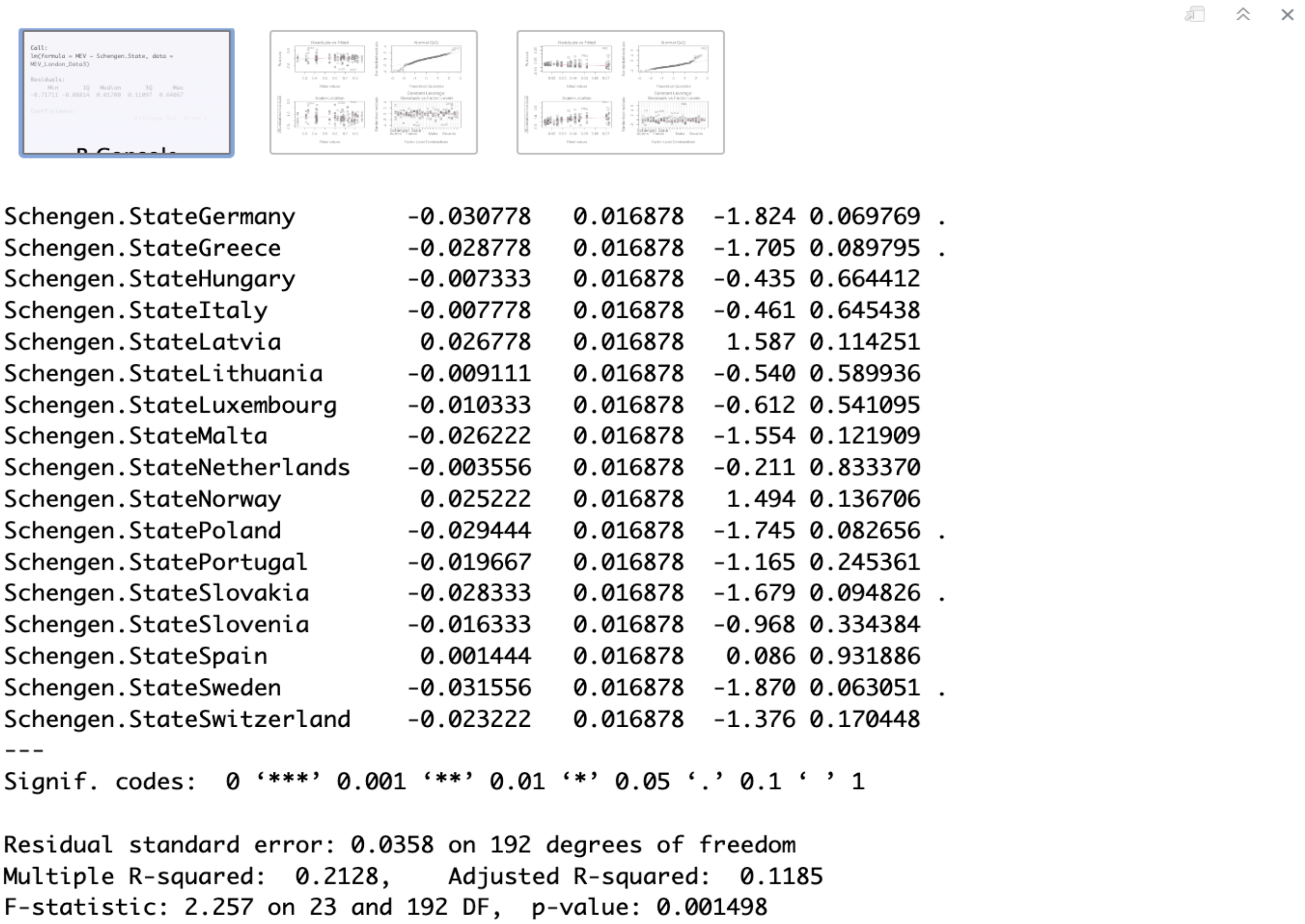


```
{r}
install.packages("dplyr", repos = 'http://cran.us.r-project.org')
library(dplyr)
MEV_London_Data3<-unite(MEV_London_Data,Year,Schengen.State,sep="")
library(tidyr)
names(MEV_London_Data3)[1]="Schengen.State"
names(MEV_London_Data3)[2]="MEV"
longdata_MEV_3<-gather(MEV_London_Data3,Schengen.State,MEV)
res.aov1<-aov(MEV ~ Schengen.State,data=MEV_London_Data3)
summary(res.aov1)
Reject_London_Data3<-unite(Reject_London_Data2,Year,Schengen.State,sep="")
library(tidyr)
names(Reject_London_Data3)[1]="Schengen.State"
names(Reject_London_Data3)[2]="Reject"
longdata_Reject_3<-gather(Reject_London_Data3,Schengen.State,Reject)
res.aov2<-aov(Reject ~ Schengen.State,data=Reject_London_Data3)
summary(res.aov2)
```

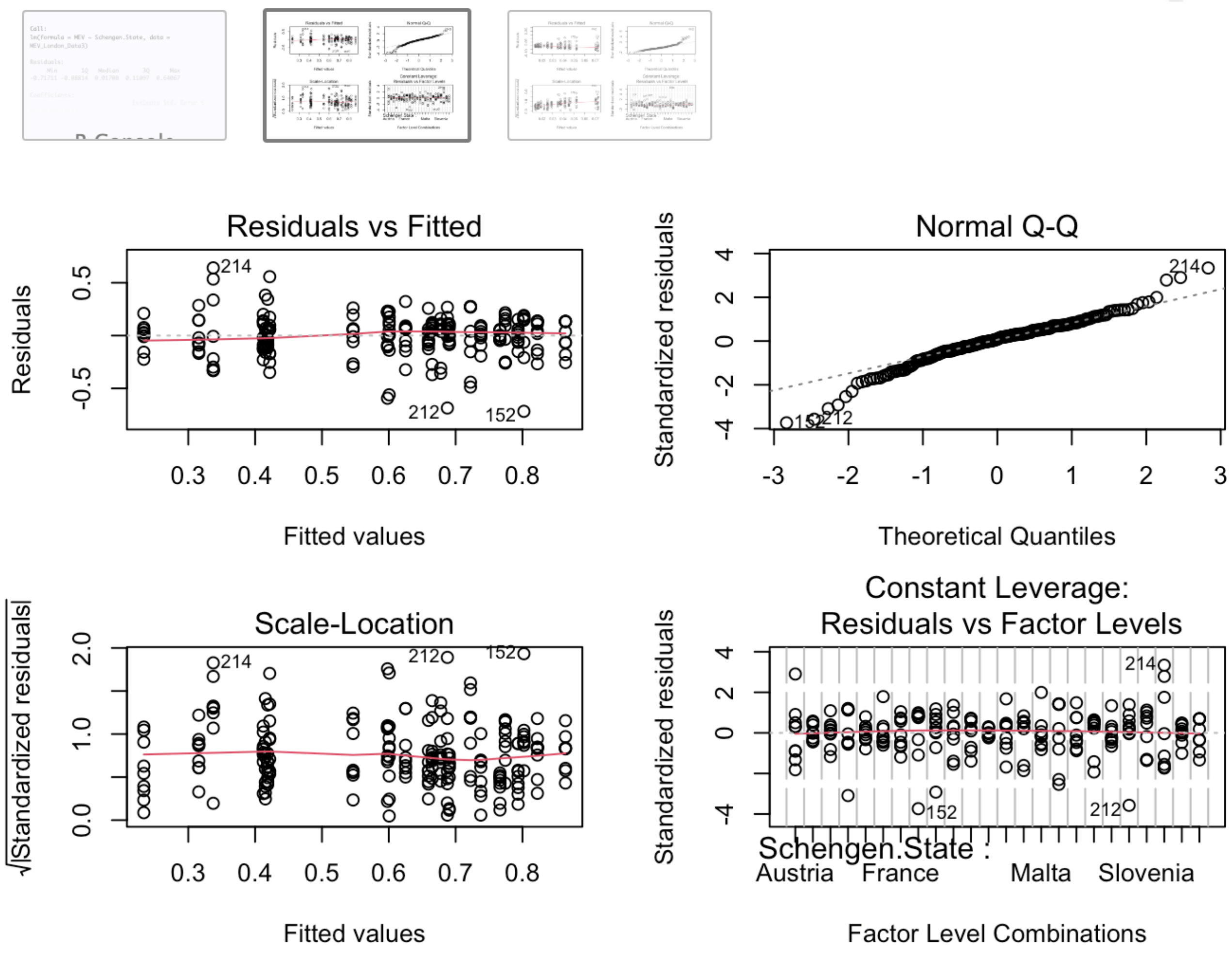
The attempt on regression



```
{r}
summary(lm(MEV ~ Schengen.State,data=MEV_London_Data3))
summary(lm(Reject ~ Schengen.State,data=Reject_London_Data3))
par(mfrow=c(2,2))
plot(lm(MEV ~ Schengen.State,data=MEV_London_Data3))
plot(lm(Reject ~ Schengen.State,data=Reject_London_Data3))
```

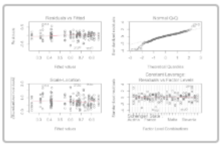


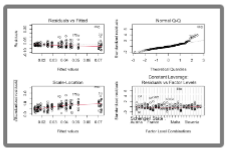
```
Schengen.StateGermany        -0.030778   0.016878  -1.824 0.069769 .
Schengen.StateGreece         -0.028778   0.016878  -1.705 0.089795 .
Schengen.StateHungary        -0.007333   0.016878  -0.435 0.664412
Schengen.StateItaly          -0.007778   0.016878  -0.461 0.645438
Schengen.StateLatvia          0.026778   0.016878   1.587 0.114251
Schengen.StateLithuania      -0.009111   0.016878  -0.540 0.589936
Schengen.StateLuxembourg     -0.010333   0.016878  -0.612 0.541095
Schengen.StateMalta          -0.026222   0.016878  -1.554 0.121909
Schengen.StateNetherlands    -0.003556   0.016878  -0.211 0.833370
Schengen.StateNorway          0.025222   0.016878   1.494 0.136706
Schengen.StatePoland         -0.029444   0.016878  -1.745 0.082656 .
Schengen.StatePortugal       -0.019667   0.016878  -1.165 0.245361
Schengen.StateSlovakia       -0.028333   0.016878  -1.679 0.094826 .
Schengen.StateSlovenia       -0.016333   0.016878  -0.968 0.334384
Schengen.StateSpain           0.001444   0.016878   0.086 0.931886
Schengen.StateSweden         -0.031556   0.016878  -1.870 0.063051 .
Schengen.StateSwitzerland    -0.023222   0.016878  -1.376 0.170448
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.0358 on 192 degrees of freedom
Multiple R-squared:  0.2128,    Adjusted R-squared:  0.1185
F-statistic: 2.257 on 23 and 192 DF,  p-value: 0.001498
```

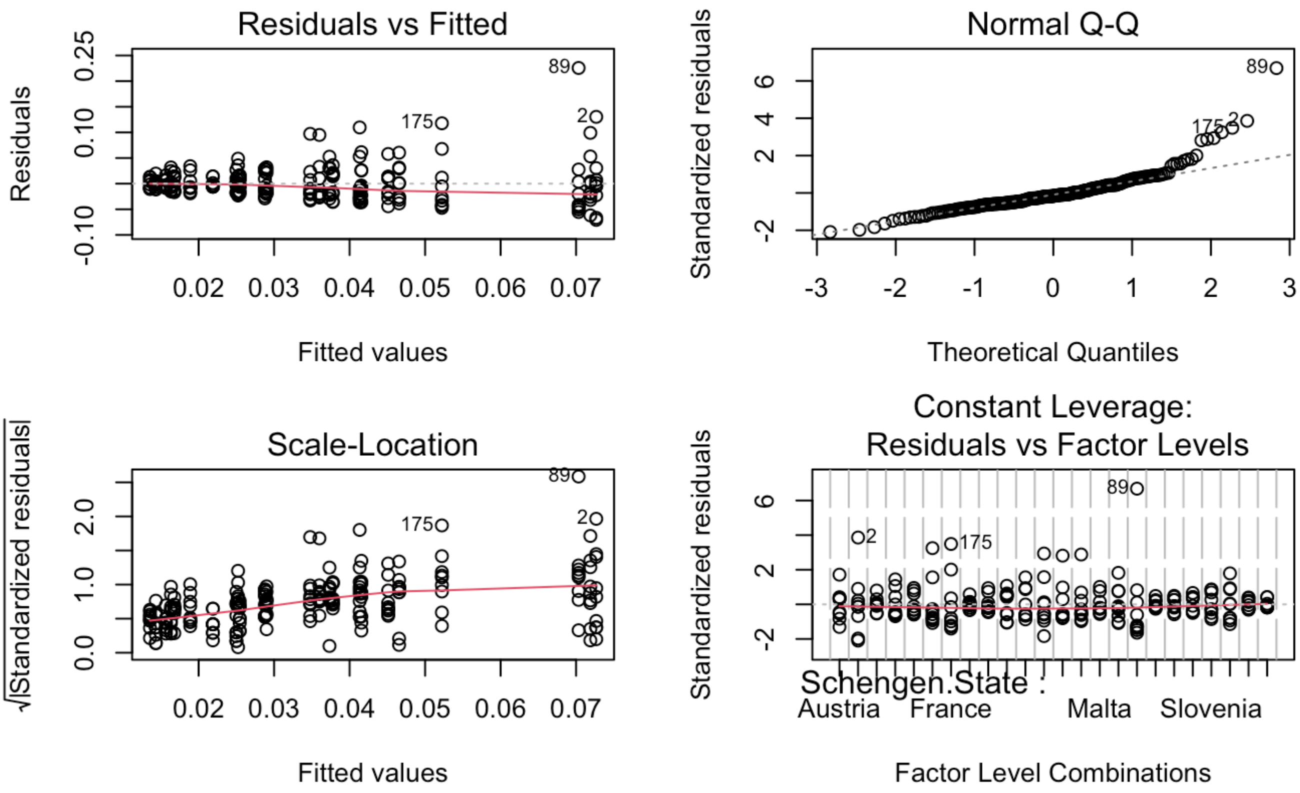


```
Call:
lm(formula = MEV ~ Schengen.State, data =
MEV_London_Data3)

Residuals:
     Min       1Q   Median       3Q      Max
-0.71711 -0.08814  0.01708  0.11097  0.64067

Coefficients:
                          Estimate Std. Error t
value Pr(>|t|)
```

R Console







Conclusion:(>0.30 for MEV: CH,IT,DE,EE,SI,LV,SE,NL) the lm formula can be concluded as: MEV=0.045+0.0275 (which is again, useless) R^squared for MEV was lower than 0.4 and R^squared for rejection was lower than 0.1, does not seems convincing.} ```