Prueba2

Beltran

9/10/2019

Cargo las librerías necesarias en un primer momento

```
library(tidyverse)
```

```
## -- Attaching packages ------------------------------------------------------------------------ tidyverse
```

```
## v ggplot2 3.2.1     v purrr   0.3.2
## v tibble  2.1.3     v dplyr   0.8.3
## v tidyr   1.0.0     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.4.0
```

```
## -- Conflicts --------------------------------------------------------------------------- tidyverse_conflicts()
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(dplyr)
```

#Lectura del fichero nba.csv

```
mData=read.csv("nba.csv")
```

Observo la información acerca de las variables contenidas en el dataset

```
summary(mData)
```

```
##              Player        Salary            NBA_Country  NBA_DraftNumber
##  Kay Felder     :  3   Min.   :   46080   USA      :374   Min.   : 1.00
##  Aaron Brooks   :  1   1st Qu.: 1471382   Canada   : 12   1st Qu.:11.00
##  Aaron Gordon   :  1   Median : 3202217   France   :  9   Median :25.00
##  Aaron Harrison :  1   Mean   : 6636507   Australia:  8   Mean   :29.45
##  Abdel Nader    :  1   3rd Qu.:10000000   Spain    :  7   3rd Qu.:47.00
##  Al-Farouq Aminu:  1   Max.   :34682550   Croatia  :  6   Max.   :62.00
##  (Other)        :477                      (Other)  : 69
##       Age              Tm            G               MP
##  Min.   :19.00   TOT    : 55   Min.   : 1.00   Min.   :   1
##  1st Qu.:23.00   DAL    : 18   1st Qu.:29.00   1st Qu.: 381
##  Median :26.00   MEM    : 17   Median :59.00   Median :1134
##  Mean   :26.26   UTA    : 17   Mean   :50.17   Mean   :1154
##  3rd Qu.:29.00   ATL    : 16   3rd Qu.:71.00   3rd Qu.:1819
##  Max.   :41.00   GSW    : 16   Max.   :79.00   Max.   :2898
##                  (Other):346
##       PER              TS.              X3PAr             FTr
##  Min.   :-41.10   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:  9.80   1st Qu.:0.5055   1st Qu.:0.1670   1st Qu.:0.1550
```

```
##  Median : 13.20   Median :0.5450   Median :0.3460   Median :0.2310
##  Mean   : 13.26   Mean   :0.5354   Mean   :0.3374   Mean   :0.2634
##  3rd Qu.: 16.50   3rd Qu.:0.5825   3rd Qu.:0.4810   3rd Qu.:0.3195
##  Max.   :134.10   Max.   :1.5000   Max.   :1.0000   Max.   :5.3330
##                   NA's   :2        NA's   :2        NA's   :2
##       ORB.             DRB.             TRB.             AST.
##  Min.   : 0.000   Min.   : 0.00   Min.   : 0.000   Min.   : 0.00
##  1st Qu.: 1.800   1st Qu.:10.20   1st Qu.: 6.200   1st Qu.: 6.90
##  Median : 3.200   Median :14.00   Median : 8.700   Median : 9.90
##  Mean   : 4.874   Mean   :14.95   Mean   : 9.908   Mean   :12.95
##  3rd Qu.: 7.000   3rd Qu.:18.80   3rd Qu.:13.300   3rd Qu.:17.60
##  Max.   :35.900   Max.   :37.60   Max.   :26.500   Max.   :49.40
##
##       STL.             BLK.             TOV.             USG.
##  Min.   : 0.000   Min.   : 0.000   Min.   : 0.00   Min.   : 0.0
##  1st Qu.: 1.000   1st Qu.: 0.600   1st Qu.: 9.90   1st Qu.:15.0
##  Median : 1.500   Median : 1.200   Median :12.50   Median :17.9
##  Mean   : 1.529   Mean   : 1.713   Mean   :13.14   Mean   :18.9
##  3rd Qu.: 1.900   3rd Qu.: 2.200   3rd Qu.:15.75   3rd Qu.:22.2
##  Max.   :12.500   Max.   :13.400   Max.   :66.70   Max.   :45.1
##                                    NA's   :2
##       OWS              DWS              WS              WS.48
##  Min.   :-2.300   Min.   :0.000   Min.   :-1.200   Min.   :-1.06300
##  1st Qu.: 0.000   1st Qu.:0.300   1st Qu.: 0.300   1st Qu.: 0.04000
##  Median : 0.800   Median :1.000   Median : 1.800   Median : 0.08300
##  Mean   : 1.275   Mean   :1.176   Mean   : 2.455   Mean   : 0.07996
##  3rd Qu.: 2.000   3rd Qu.:1.800   3rd Qu.: 3.600   3rd Qu.: 0.12300
##  Max.   :11.400   Max.   :5.600   Max.   :15.000   Max.   : 2.71300
##
##       OBPM              DBPM               BPM              VORP
##  Min.   :-36.500   Min.   :-14.3000   Min.   :-49.20   Min.   :-1.3000
##  1st Qu.: -2.700   1st Qu.: -1.7000   1st Qu.: -3.60   1st Qu.:-0.1000
##  Median : -1.100   Median : -0.4000   Median : -1.30   Median : 0.1000
##  Mean   : -1.271   Mean   : -0.4895   Mean   : -1.76   Mean   : 0.5988
##  3rd Qu.:  0.400   3rd Qu.:  1.0000   3rd Qu.:  0.50   3rd Qu.: 0.9000
##  Max.   : 68.700   Max.   :  6.8000   Max.   : 54.40   Max.   : 8.6000
##
```

Elimino los valores NA

```
mData <- na.omit(mData)
```

#Establecimiento de la regresión

```
regres01=lm(Salary~NBA_DraftNumber+log(Age)+Tm+G+MP+PER+TS.+ORB.+DRB.+AST.+STL.+BLK.+TOV.+USG.+OWS
            +DWS+OBPM+DBPM+VORP, data = mData)
summary(regres01)
```

```
##
## Call:
## lm(formula = Salary ~ NBA_DraftNumber + log(Age) + Tm + G + MP +
##     PER + TS. + ORB. + DRB. + AST. + STL. + BLK. + TOV. + USG. +
##     OWS + DWS + OBPM + DBPM + VORP, data = mData)
```

```
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -14320585  -3042432   -280851   2373039  21376527
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     -40055640    6163448  -6.499 2.22e-10 ***
## NBA_DraftNumber    -61992      13323  -4.653 4.35e-06 ***
## log(Age)         14850952    1607279   9.240  < 2e-16 ***
## TmBOS               76539    1980101   0.039   0.9692
## TmBRK               44500    1969344   0.023   0.9820
## TmCHI            -1806122    1891288  -0.955   0.3401
## TmCHO             1163835    1915021   0.608   0.5437
## TmCLE             1915174    2137396   0.896   0.3707
## TmDAL            -1752650    1786845  -0.981   0.3272
## TmDEN             -542796    1967078  -0.276   0.7827
## TmDET              115325    1932843   0.060   0.9524
## TmGSW              734180    1905109   0.385   0.7001
## TmHOU            -2571970    2026783  -1.269   0.2051
## TmIND             -793615    1890040  -0.420   0.6748
## TmLAC              -36395    1989689  -0.018   0.9854
## TmLAL             -968561    1894272  -0.511   0.6094
## TmMEM              486417    1819783   0.267   0.7894
## TmMIA            -1056773    1913745  -0.552   0.5811
## TmMIL              -14155    1895473  -0.007   0.9940
## TmMIN              -88075    2030601  -0.043   0.9654
## TmNOP            -1275700    1924965  -0.663   0.5079
## TmNYK              123046    1907602   0.065   0.9486
## TmOKC             1646891    1956078   0.842   0.4003
## TmORL              267751    1871622   0.143   0.8863
## TmPHI            -1094204    1912781  -0.572   0.5676
## TmPHO             -931906    1924174  -0.484   0.6284
## TmPOR              766037    1956996   0.391   0.6957
## TmSAC            -1102850    2010417  -0.549   0.5836
## TmSAS             -173066    1981045  -0.087   0.9304
## TmTOR             1600229    2026769   0.790   0.4302
## TmTOT             -552398    1498373  -0.369   0.7126
## TmUTA            -1548658    1923626  -0.805   0.4212
## TmWAS             1521901    1951792   0.780   0.4360
## G                 -170662      26182  -6.518 1.98e-10 ***
## MP                   6015       1107   5.435 9.17e-08 ***
## PER                -41783     159094  -0.263   0.7930
## TS.               -621557    4409033  -0.141   0.8880
## ORB.                 3220      71759   0.045   0.9642
## DRB.                66622      71816   0.928   0.3541
## AST.               -12625      40637  -0.311   0.7562
## STL.               -555635     428212  -1.298   0.1951
## BLK.               -225176     296306  -0.760   0.4477
## TOV.                -24150      52405  -0.461   0.6451
## USG.                149448      78120   1.913   0.0564 .
## OWS                 519572     355353   1.462   0.1444
## DWS                 158199     813343   0.195   0.8459
## OBPM                 92467     268492   0.344   0.7307
```

```
## DBPM               477660     297219   1.607   0.1088
## VORP               539530     644490   0.837   0.4030
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5114000 on 434 degrees of freedom
## Multiple R-squared:  0.5697, Adjusted R-squared:  0.5221
## F-statistic: 11.97 on 48 and 434 DF,  p-value: < 2.2e-16
```

En la regresion asumo que la edad sigue una funcion logarítmica,llegado un momento, tener más años no contribuye a un mayor salario.La variable de conversión de tiro incluye datos acerca de la conversión de tiros de 2, de 3 y tiros libres. Por tanto,esta ya incluye información acerca de las 3 ya mencionadas. Sin embargo, los rebotes en vez de meter el porcentaje correspondiente al total, añado la variable de porcentaje de los defensivos y los ofensivos por separado. Se tiene en cuenta también el porcentaje de asistencias, robos, bloqueos y pérdidas de balón. En el modelo se tienen en cuenta también como variables la contribución ofensiva y defensiva del jugador a las victorias del equipo. #Normalidad ##qqplot

```
library(car)
```

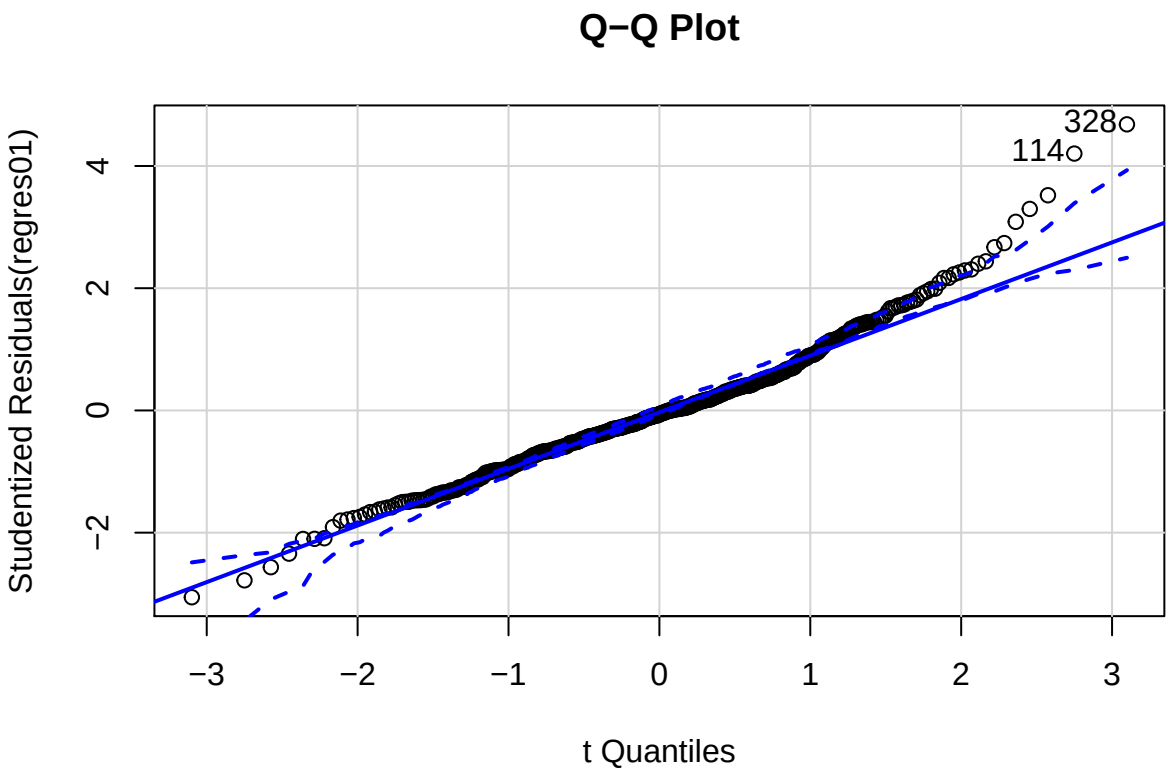
```
## Loading required package: carData
```

```
##
## Attaching package: 'car'
```

```
## The following object is masked from 'package:dplyr':
##
##     recode
```

```
## The following object is masked from 'package:purrr':
##
##     some
```

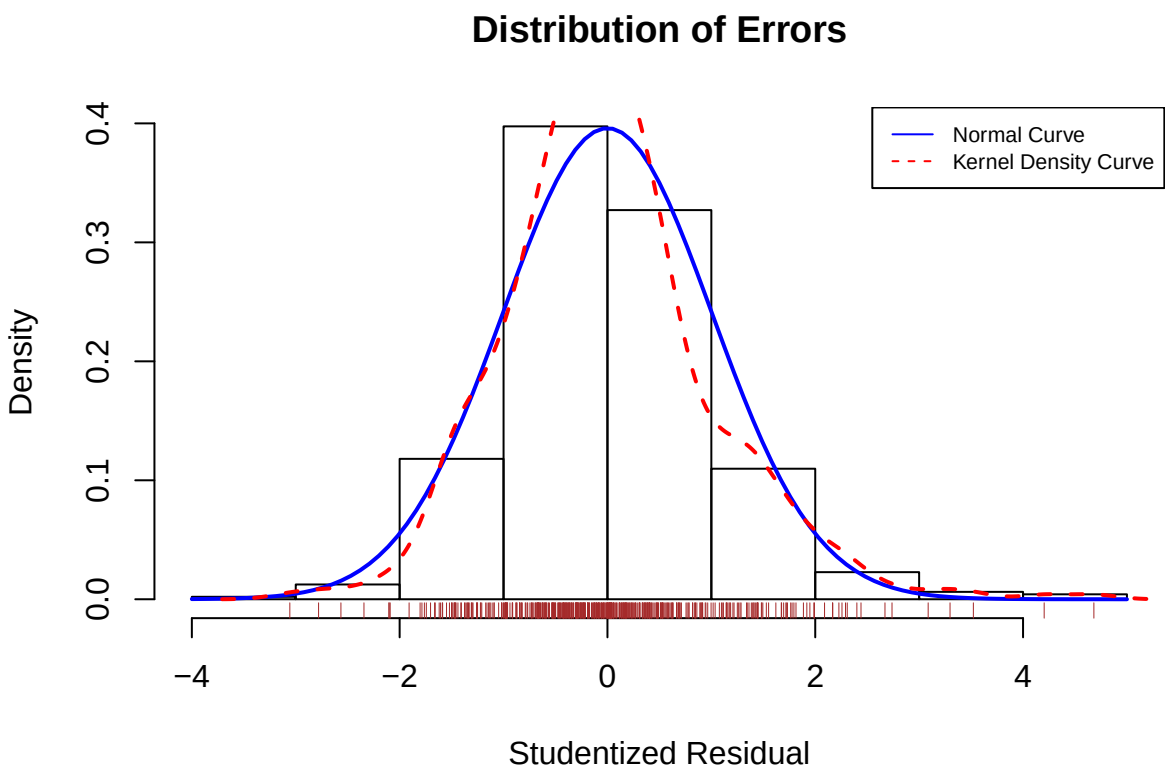
```
qqPlot(regres01, labels=row.names(mData), id.method="identify",
       simulate=TRUE, main="Q-Q Plot")
```




```
## 114 328
## 112 326
```

Comprobamos si la distribución de la muestra se asemeja a una normal. ##Histograma+densidad+normal+rug

```
residplot <- function(fit, nbreaks=10) {
  z <- rstudent(fit)
  hist(z, breaks=nbreaks, freq=FALSE,
       xlab="Studentized Residual",
       main="Distribution of Errors")
  rug(jitter(z), col="brown")
  curve(dnorm(x, mean=mean(z), sd=sd(z)),
        add=TRUE, col="blue", lwd=2)
  lines(density(z)$x, density(z)$y,
        col="red", lwd=2, lty=2)
  legend("topright",
         legend = c( "Normal Curve", "Kernel Density Curve"),
         lty=1:2, col=c("blue","red"), cex=.7)
}
residplot(regres01)
```



Represento gráficamente la distribución de los errores. Para comprobar la normalidad de la distribución realizaré los contrastes de Jaque-Bera y Shapiro-Wilk. #Jarque Bera

```
vResid=resid(regres01)
library(fBasics)
```

```
## Loading required package: timeDate
```

```
## Loading required package: timeSeries
```

```
##
## Attaching package: 'fBasics'
```

```
## The following object is masked from 'package:car':
##
##     densityPlot
```

```
jbTest(vResid)
```

```
## Warning in interpp.old(x, y, z, xo, yo, ncp = 0, extrap = FALSE, duplicate
## = duplicate, : interpp.old() is deprecated, future versions will only
## provide interpp()
```

```
## Warning in interpp.old(x, y, z, xo, yo, ncp = 0, extrap = FALSE, duplicate
## = duplicate, : interpp.old() is deprecated, future versions will only
## provide interpp()
```

```
##
## Title:
##  Jarque - Bera Normality Test
##
## Test Results:
##   PARAMETER:
##     Sample Size: 483
##   STATISTIC:
##     LM: 79.583
##     ALM: 82.272
##   P VALUE:
##     Asymptotic: < 2.2e-16
##
## Description:
##  Thu Oct 10 15:27:02 2019 by user: beltro
```

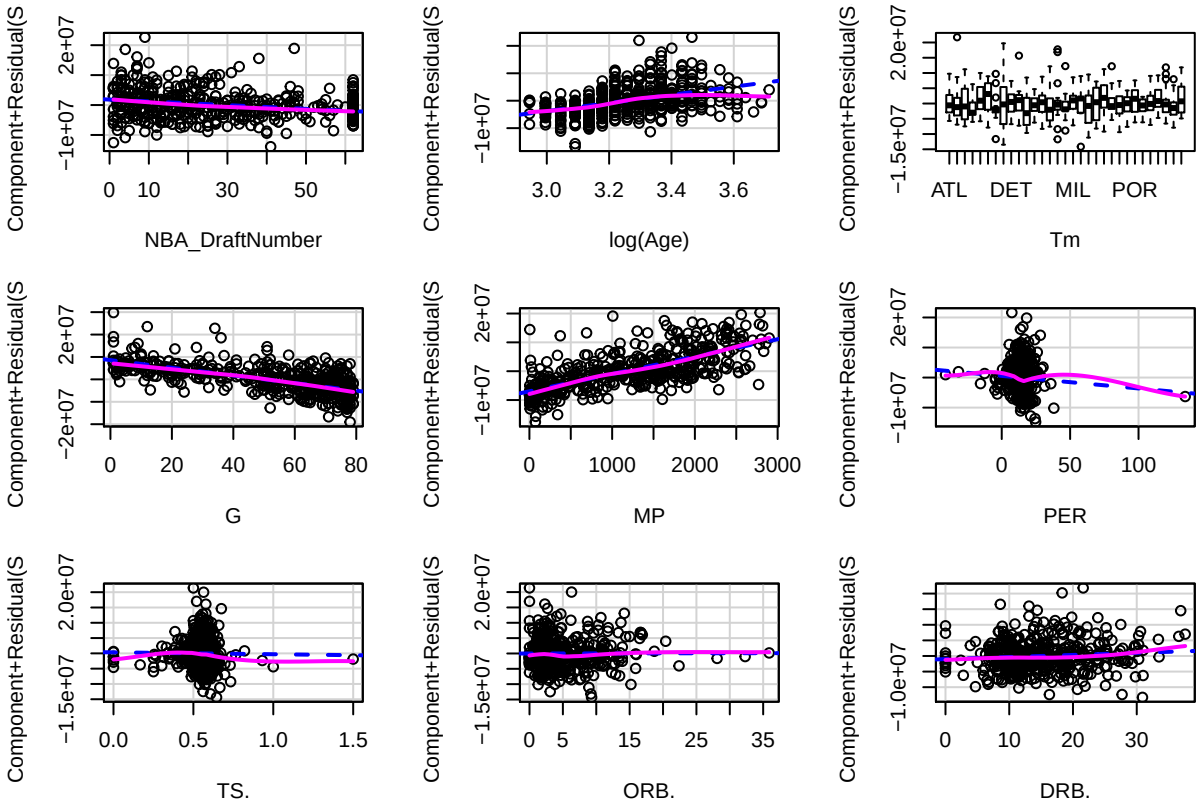
Dada la muestra y el p-value obtenido, con un nivel de significancia del 5% se procede a rechazar la hipótesis nula, por tanto se asume la no normalidad de la muestra. #Shapiro-Wilk

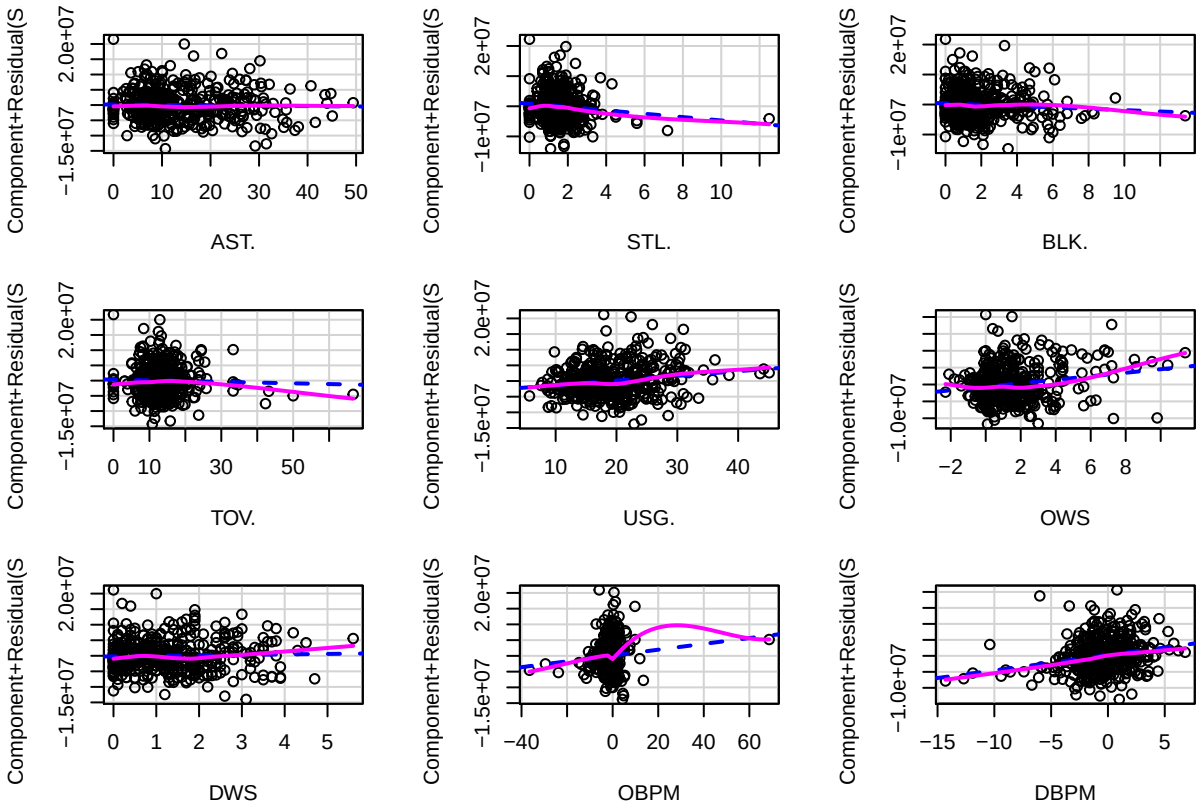
```
shapiro.test(vResid)
```

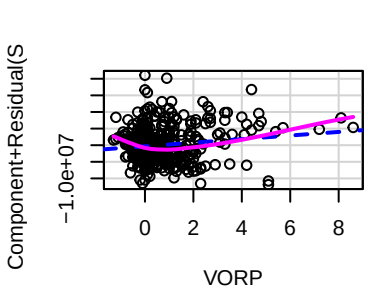
```
##
##  Shapiro-Wilk normality test
##
## data:  vResid
## W = 0.9744, p-value = 1.762e-07
```

De nuevo, con los datos de la muestra y el p-value obtenido, a un nivel de significancia del 5% se procede a rechazar la hipótesis nula y asumir la no normalidad de la distribución. #Linealidad

```
crPlots(regres01)
```


Component+Residual(S
NBA_DraftNumber
log(Age)
Tm
ATL
DET
MIL
POR
G
MP
PER
TS.
ORB.
DRB.


Component+Residual(S
AST.
STL.
BLK.
TOV.
USG.
OWS
DWS
OBPM
DBPM



#Homocedasticidad Llevo a cabo el contraste de Breusch-Pagan para combrobar si el modelo es homocedástico o heterocedástico.

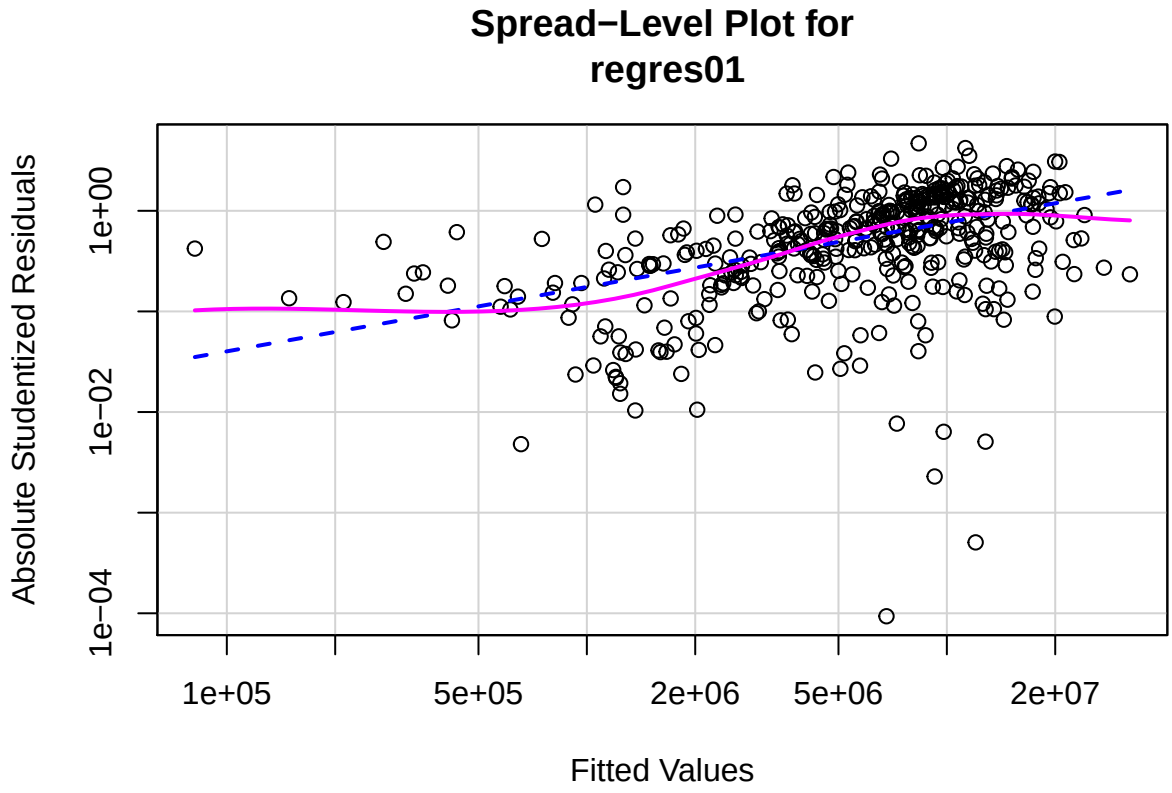
```
ncvTest(regres01)
```

```
## Non-constant Variance Score Test
## Variance formula: ~ fitted.values
## Chisquare = 78.45524, Df = 1, p = < 2.22e-16
```

Con los datos de la muestra y el p-valor obtenido, para un nivel de significatividad del 5% se rechaza la hipótesis nula, el modelo es heterocedástico.

```
library(car)
spreadLevelPlot(regres01)
```

```
## Warning in spreadLevelPlot.lm(regres01):
## 45 negative fitted values removed
```




```
##
## Suggested power transformation:  0.3604086
```

#Validación global Cabe la posibilidad de llevar a cabo todos los contrastes de hipótesis a la vez, mediante el test de Peña.

```
library(gvlma)
gvmodel <- gvlma(regres01)
summary(gvmodel)
```

```
##
## Call:
## lm(formula = Salary ~ NBA_DraftNumber + log(Age) + Tm + G + MP +
##     PER + TS. + ORB. + DRB. + AST. + STL. + BLK. + TOV. + USG. +
##     OWS + DWS + OBPM + DBPM + VORP, data = mData)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -14320585  -3042432   -280851   2373039  21376527
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     -40055640    6163448  -6.499 2.22e-10 ***
## NBA_DraftNumber    -61992      13323  -4.653 4.35e-06 ***
## log(Age)         14850952    1607279   9.240  < 2e-16 ***
```

```
## TmBOS              76539    1980101   0.039   0.9692
## TmBRK              44500    1969344   0.023   0.9820
## TmCHI           -1806122    1891288  -0.955   0.3401
## TmCHO            1163835    1915021   0.608   0.5437
## TmCLE            1915174    2137396   0.896   0.3707
## TmDAL           -1752650    1786845  -0.981   0.3272
## TmDEN            -542796    1967078  -0.276   0.7827
## TmDET             115325    1932843   0.060   0.9524
## TmGSW             734180    1905109   0.385   0.7001
## TmHOU           -2571970    2026783  -1.269   0.2051
## TmIND            -793615    1890040  -0.420   0.6748
## TmLAC             -36395    1989689  -0.018   0.9854
## TmLAL            -968561    1894272  -0.511   0.6094
## TmMEM             486417    1819783   0.267   0.7894
## TmMIA           -1056773    1913745  -0.552   0.5811
## TmMIL             -14155    1895473  -0.007   0.9940
## TmMIN             -88075    2030601  -0.043   0.9654
## TmNOP           -1275700    1924965  -0.663   0.5079
## TmNYK             123046    1907602   0.065   0.9486
## TmOKC            1646891    1956078   0.842   0.4003
## TmORL             267751    1871622   0.143   0.8863
## TmPHI           -1094204    1912781  -0.572   0.5676
## TmPHO            -931906    1924174  -0.484   0.6284
## TmPOR             766037    1956996   0.391   0.6957
## TmSAC           -1102850    2010417  -0.549   0.5836
## TmSAS            -173066    1981045  -0.087   0.9304
## TmTOR            1600229    2026769   0.790   0.4302
## TmTOT            -552398    1498373  -0.369   0.7126
## TmUTA           -1548658    1923626  -0.805   0.4212
## TmWAS            1521901    1951792   0.780   0.4360
## G                -170662      26182  -6.518 1.98e-10 ***
## MP                  6015       1107   5.435 9.17e-08 ***
## PER               -41783     159094  -0.263   0.7930
## TS.              -621557    4409033  -0.141   0.8880
## ORB.                3220      71759   0.045   0.9642
## DRB.               66622      71816   0.928   0.3541
## AST.              -12625      40637  -0.311   0.7562
## STL.              -555635     428212  -1.298   0.1951
## BLK.              -225176     296306  -0.760   0.4477
## TOV.               -24150      52405  -0.461   0.6451
## USG.               149448      78120   1.913   0.0564 .
## OWS                519572     355353   1.462   0.1444
## DWS                158199     813343   0.195   0.8459
## OBPM                92467     268492   0.344   0.7307
## DBPM               477660     297219   1.607   0.1088
## VORP               539530     644490   0.837   0.4030
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5114000 on 434 degrees of freedom
## Multiple R-squared:  0.5697, Adjusted R-squared:  0.5221
## F-statistic: 11.97 on 48 and 434 DF,  p-value: < 2.2e-16
##
##
```

```
## ASSESSMENT OF THE LINEAR MODEL ASSUMPTIONS
## USING THE GLOBAL TEST ON 4 DEGREES-OF-FREEDOM:
## Level of Significance =  0.05
##
## Call:
##  gvlma(x = regres01)
##
##                       Value   p-value                   Decision
## Global Stat        121.87359 0.000e+00 Assumptions NOT satisfied!
## Skewness            32.12238 1.448e-08 Assumptions NOT satisfied!
## Kurtosis            47.46015 5.613e-12 Assumptions NOT satisfied!
## Link Function       42.25127 8.027e-11 Assumptions NOT satisfied!
## Heteroscedasticity   0.03979 8.419e-01    Assumptions acceptable.
```

#Multicolinealidad

```
vif(regres01)
```

```
##                      GVIF Df GVIF^(1/(2*Df))
## NBA_DraftNumber  1.458395  1        1.207640
## log(Age)         1.199354  1        1.095150
## Tm               7.426186 30        1.033981
## G                7.721132  1        2.778692
## MP              14.796312  1        3.846597
## PER             35.673414  1        5.972722
## TS.              4.521647  1        2.126416
## ORB.             1.991706  1        1.411278
## DRB.             4.386186  1        2.094322
## AST.             2.516015  1        1.586195
## STL.             3.289471  1        1.813690
## BLK.             4.586041  1        2.141504
## TOV.             1.892481  1        1.375675
## USG.             3.817651  1        1.953881
## OWS              8.255092  1        2.873168
## DWS             13.031318  1        3.609892
## OBPM            33.591975  1        5.795858
## DBPM             9.330566  1        3.054597
## VORP            11.914040  1        3.451672
```

Para valores de la raíz superiores a 2 se detecta un problema de multicolinealidad en las variables, se deben retirar estas del modelo una a una y repetir la prueba de multicolinealidad.

Elimino PER en primer lugar, establezco la nueva regresión y compruebo la multicolinealidad de nuevo.

```
regres01=lm(Salary~NBA_DraftNumber+log(Age)+Tm+G+MP+TS.+ORB.+DRB.+AST.+STL.+BLK.+TOV.+USG.+OWS
            +DWS+OBPM+DBPM+VORP, data = mData)
vif(regres01)
```

```
##                      GVIF Df GVIF^(1/(2*Df))
## NBA_DraftNumber  1.454552  1        1.206048
## log(Age)         1.184300  1        1.088255
## Tm               6.698115 30        1.032205
## G                7.559718  1        2.749494
```

```
## MP              14.617486  1        3.823282
## TS.              4.481821  1        2.117031
## ORB.             1.863935  1        1.365260
## DRB.             3.078795  1        1.754649
## AST.             2.414606  1        1.553900
## STL.             2.797248  1        1.672497
## BLK.             3.053516  1        1.747431
## TOV.             1.819967  1        1.349062
## USG.             3.447660  1        1.856787
## OWS              7.466208  1        2.732436
## DWS             12.418563  1        3.523998
## OBPM             4.954566  1        2.225885
## DBPM             8.597575  1        2.932162
## VORP            10.228842  1        3.198256
```

Elimino MP en segundo lugar, establezco la nueva regresión y compruebo la multicolinealidad de nuevo.

```
regres01=lm(Salary~NBA_DraftNumber+log(Age)+Tm+G+TS.+ORB.+DRB.+AST.+STL.+BLK.+TOV.+USG.+OWS
            +DWS+OBPM+DBPM+VORP, data = mData)
vif(regres01)
```

```
##                      GVIF Df GVIF^(1/(2*Df))
## NBA_DraftNumber  1.439925  1        1.199969
## log(Age)         1.183819  1        1.088034
## Tm               4.686252 30        1.026078
## G                4.700292  1        2.168016
## TS.              4.406437  1        2.099152
## ORB.             1.829672  1        1.352654
## DRB.             2.759329  1        1.661123
## AST.             2.379070  1        1.542424
## STL.             2.730975  1        1.652566
## BLK.             2.916812  1        1.707868
## TOV.             1.812997  1        1.346476
## USG.             3.252584  1        1.803492
## OWS              6.858264  1        2.618829
## DWS              8.255706  1        2.873274
## OBPM             4.895487  1        2.212575
## DBPM             8.515001  1        2.918047
## VORP            10.093577  1        3.177039
```

Elimino VORP en tercer lugar, establezco la nueva regresión y compruebo la multicolinealidad de nuevo.

```
regres01=lm(Salary~NBA_DraftNumber+log(Age)+Tm+G+TS.+ORB.+DRB.+AST.+STL.+BLK.+TOV.+USG.+OWS
            +DWS+OBPM+DBPM, data = mData)
vif(regres01)
```

```
##                      GVIF Df GVIF^(1/(2*Df))
## NBA_DraftNumber 1.425849  1        1.194089
## log(Age)        1.182030  1        1.087212
## Tm              4.475408 30        1.025291
## G               3.411790  1        1.847103
## TS.             4.311675  1        2.076457
```

```
## ORB.            1.829382  1        1.352547
## DRB.            2.720233  1        1.649313
## AST.            2.337281  1        1.528817
## STL.            2.719038  1        1.648950
## BLK.            2.916432  1        1.707756
## TOV.            1.799506  1        1.341457
## USG.            3.229096  1        1.796968
## OWS             2.531237  1        1.590986
## DWS             5.560563  1        2.358085
## OBPM            4.774013  1        2.184951
## DBPM            8.214341  1        2.866067
```

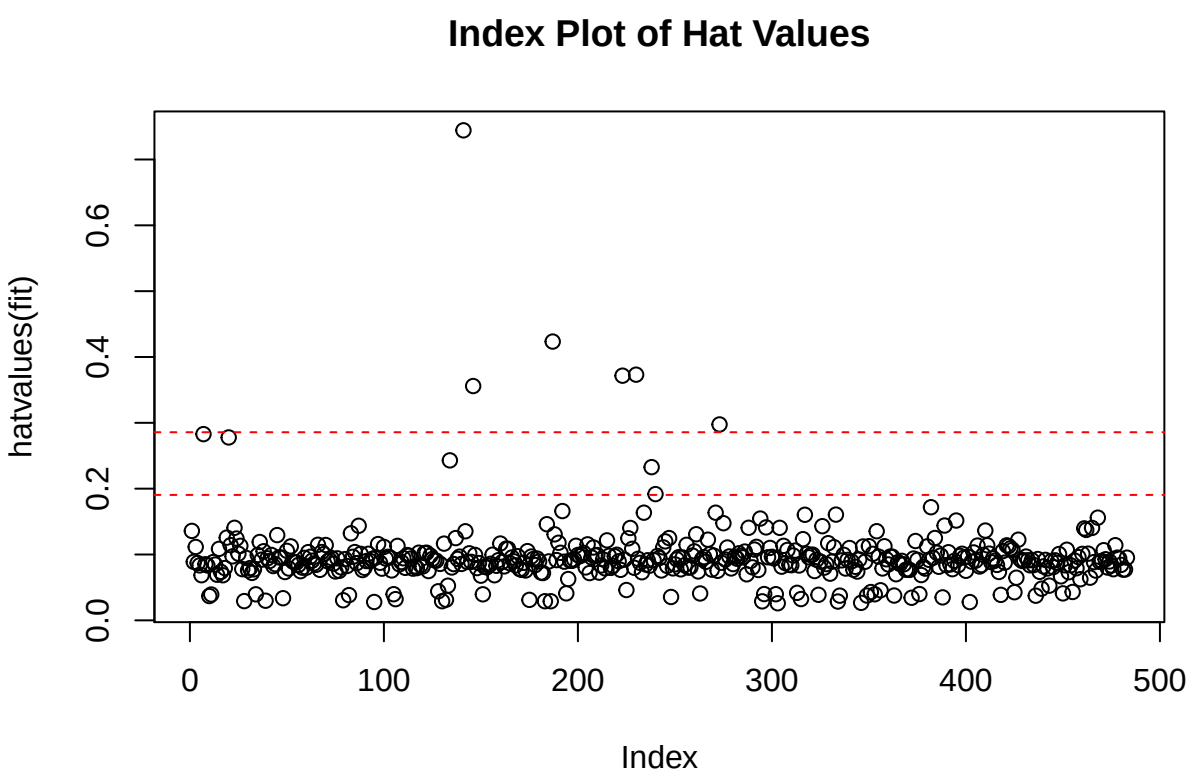
#Observaciones anómalas

```
outlierTest(regres01)
```

```
##     rstudent unadjusted p-value Bonferroni p
## 328 5.128966         4.3916e-07   0.00021212
## 114 4.158511         3.8586e-05   0.01863700
```

Represento los valores extremos.

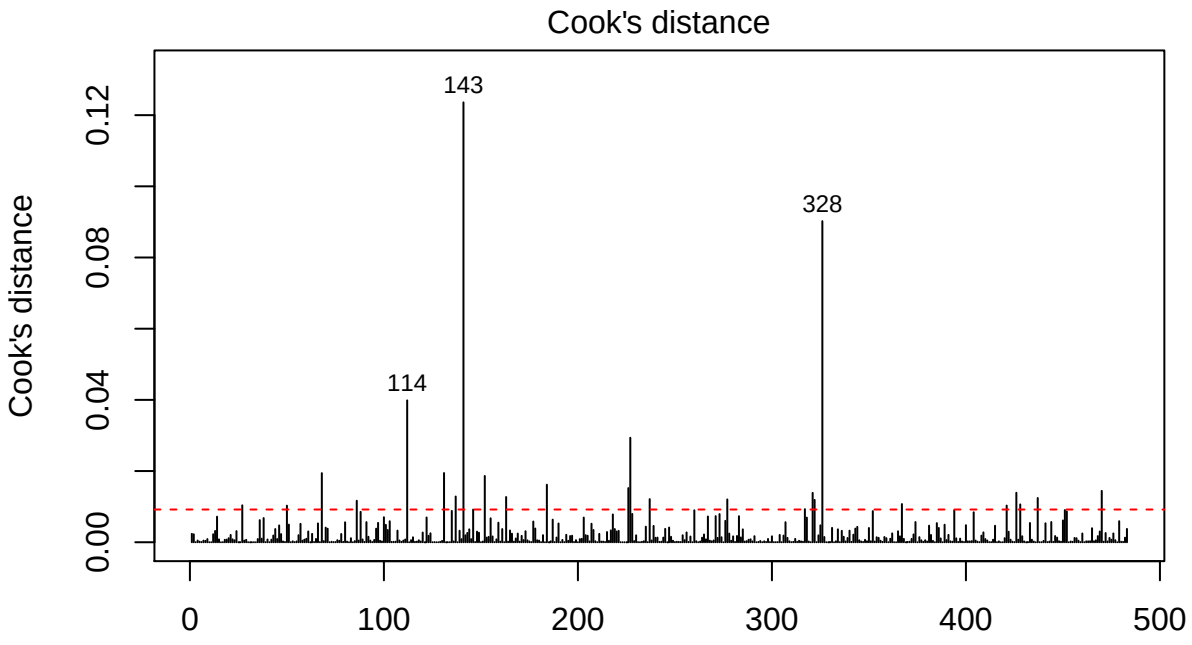
```
hat.plot <- function(fit) {
  p <- length(coefficients(fit))
  n <- length(fitted(fit))
  plot(hatvalues(fit), main="Index Plot of Hat Values")
  abline(h=c(2,3)*p/n, col="red", lty=2)
  identify(1:n, hatvalues(fit), names(hatvalues(fit)))
}
hat.plot(regres01)
```




```
## integer(0)
```

Llevo a cabo el cálculo de la distancia de Cook.

```
cutoff <- 4/(nrow(mData)-length(regres01$coefficients)-2)
plot(regres01, which=4, cook.levels=cutoff)
abline(h=cutoff, lty=2, col="red")
```




```
avPlots(regres01, ask=FALSE, id.method="identify")
```

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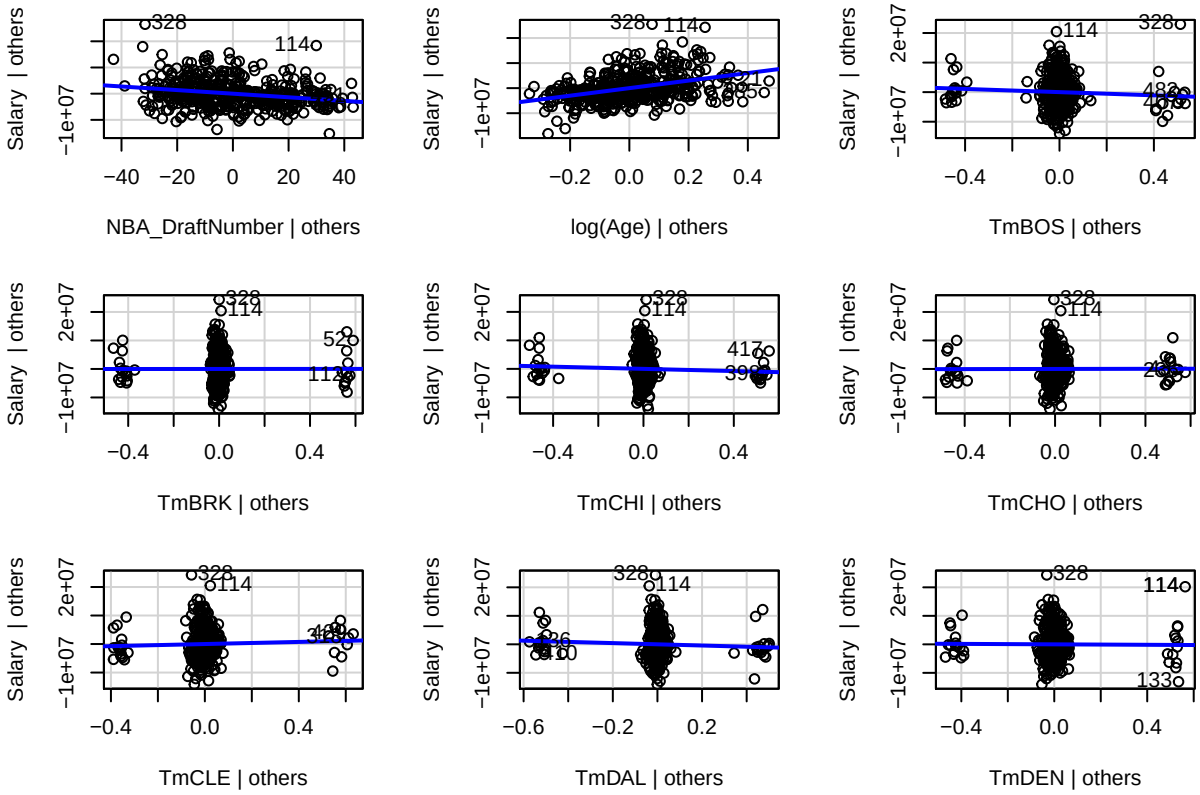


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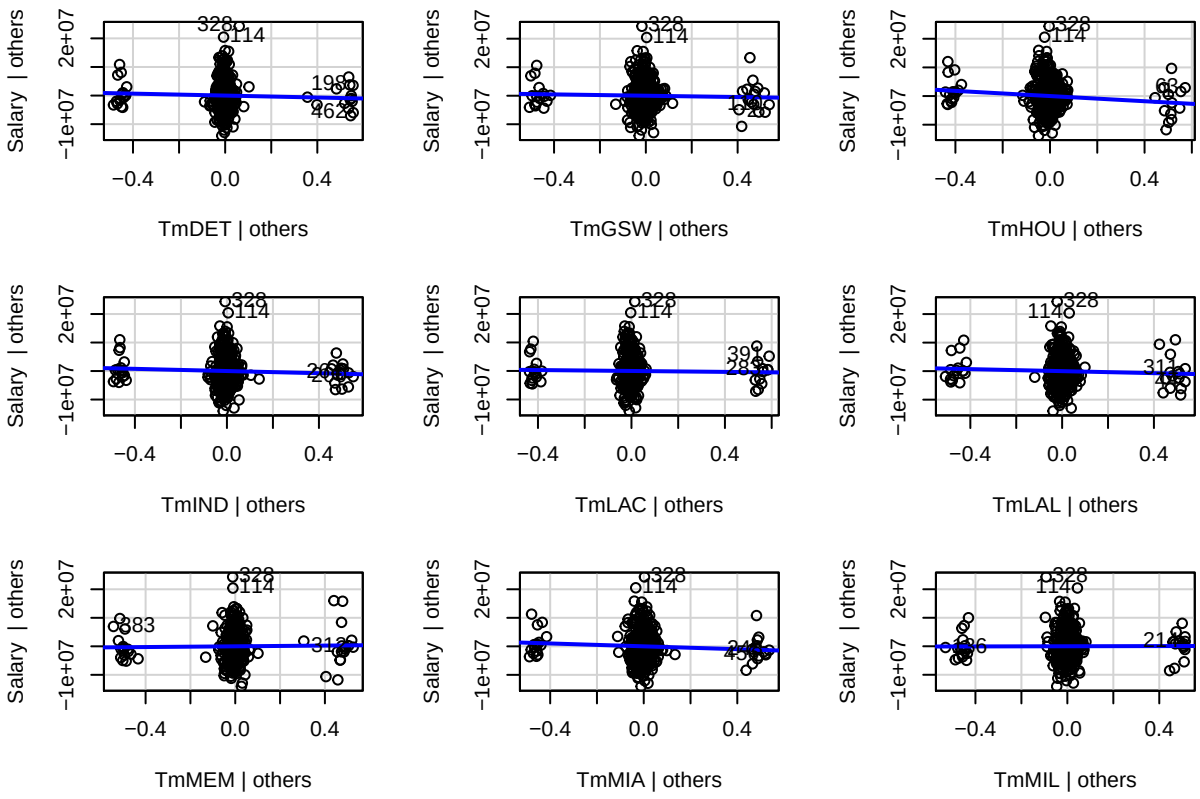

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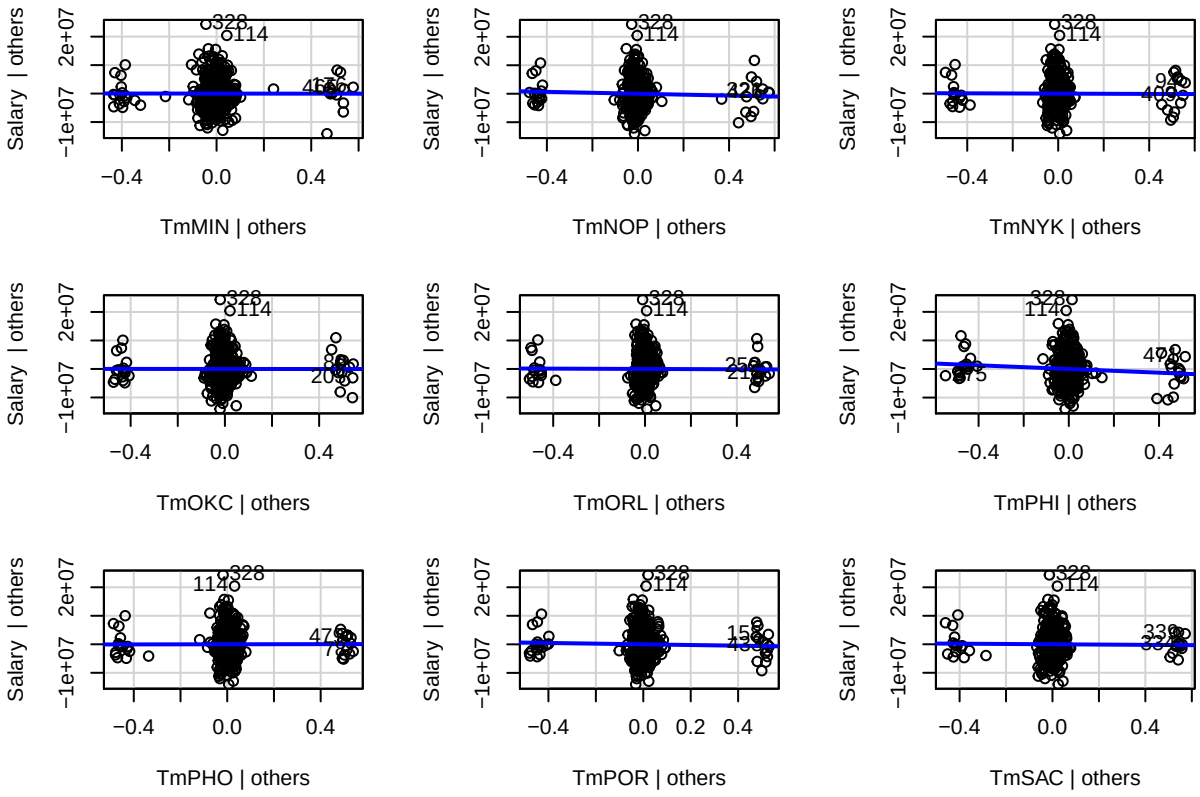


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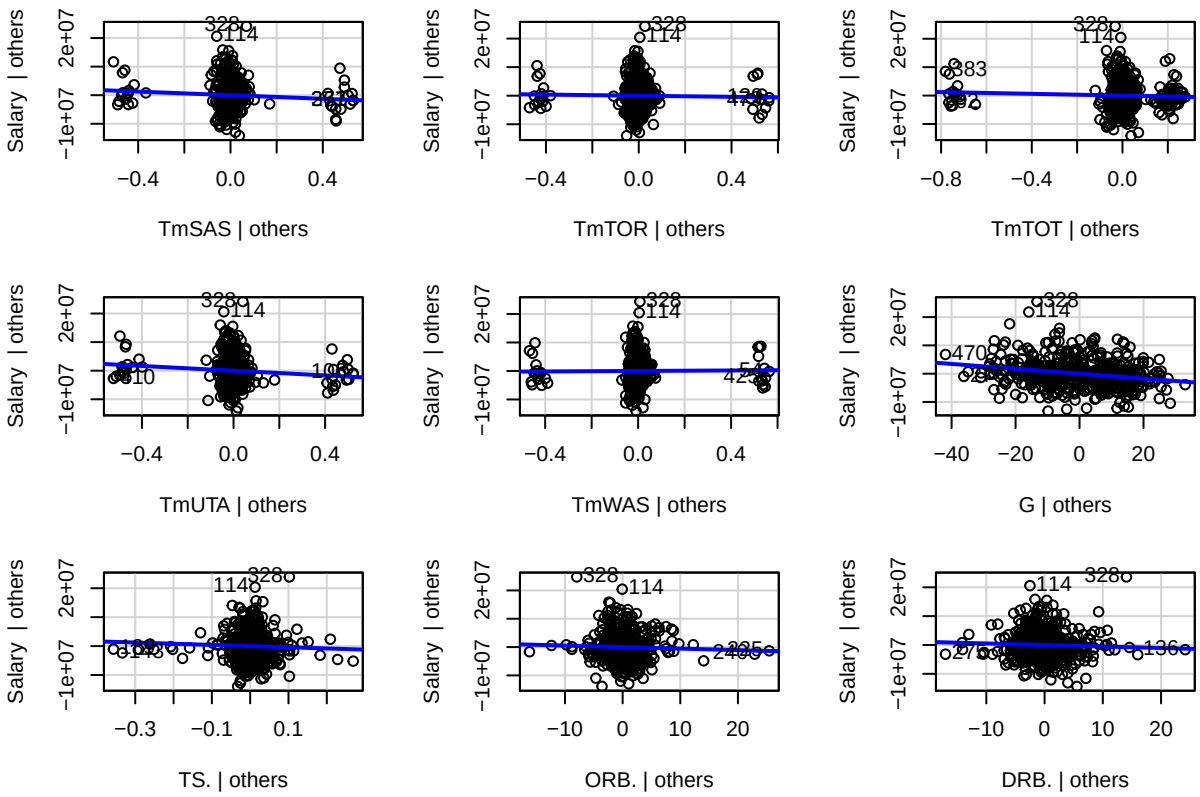

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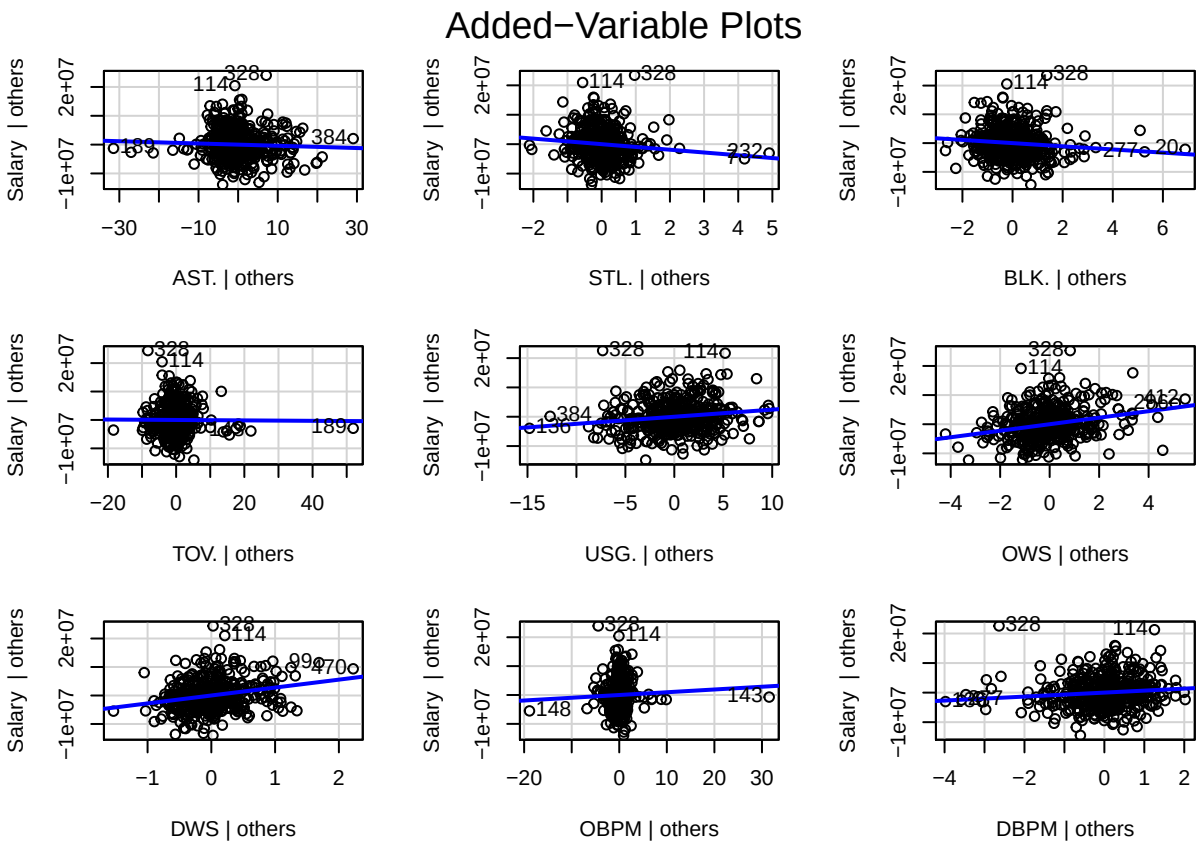


```
influencePlot(regres01, id.method="identify", main="Influence Plot",
              sub="Circle size is proportial to Cook's Distance" )
```

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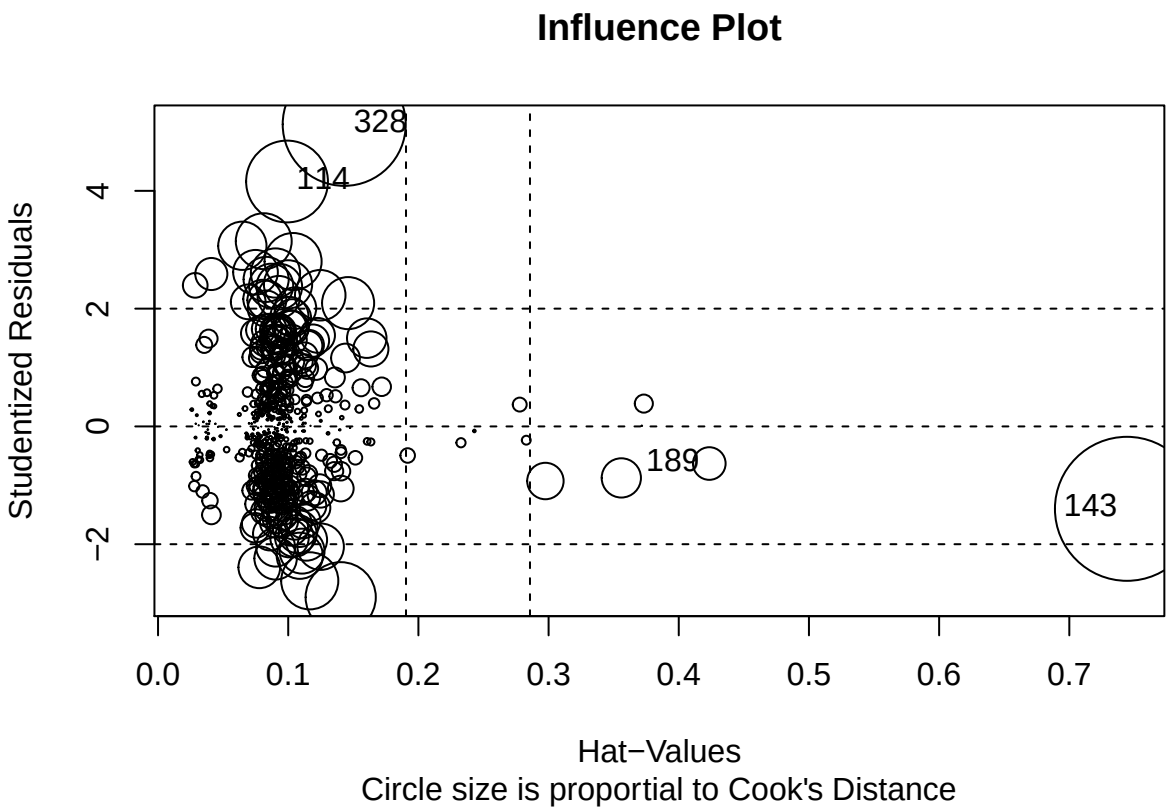
```




```
##         StudRes        Hat       CookD
## 114  4.1585113 0.09909516 0.039865177
## 143 -1.3992304 0.74426400 0.123596147
## 189 -0.6301382 0.42343634 0.006348253
## 328  5.1289655 0.14301695 0.090212899
```

Elimino los valores influyentes

```
mData <- mData[c(-328,-114,-189,-143)]
```

Vuelvo a hacer la regresión sin los valores influyentes

```
regres01=lm(Salary~NBA_DraftNumber+log(Age)+Tm+G+TS.+ORB.+DRB.+AST.+STL.+BLK.+TOV.+USG.+OWS
            +DWS+OBPM+DBPM, data = mData)
summary(regres01)
```

```
##
## Call:
## lm(formula = Salary ~ NBA_DraftNumber + log(Age) + Tm + G + TS. +
##     ORB. + DRB. + AST. + STL. + BLK. + TOV. + USG. + OWS + DWS +
##     OBPM + DBPM, data = mData)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
```

```
## -14060606  -3047953   -354708   2263758  24339375
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     -37357713    6217459  -6.009 3.95e-09 ***
## NBA_DraftNumber    -68649      13581  -5.055 6.34e-07 ***
## log(Age)         15051529    1644946   9.150  < 2e-16 ***
## TmBOS            -2701556    1972114  -1.370  0.17143
## TmBRK               32500    2030068   0.016  0.98723
## TmCHI            -1924153    1948442  -0.988  0.32393
## TmCHO              126890    1964472   0.065  0.94853
## TmCLE             1856898    2195608   0.846  0.39816
## TmDAL            -2118462    1836640  -1.153  0.24936
## TmDEN             -394907    2021431  -0.195  0.84520
## TmDET            -1700888    1963105  -0.866  0.38673
## TmGSW            -1164203    1926813  -0.604  0.54602
## TmHOU            -4512122    2047009  -2.204  0.02803 *
## TmIND            -1924616    1935586  -0.994  0.32061
## TmLAC             -816534    2041782  -0.400  0.68942
## TmLAL            -1764725    1946309  -0.907  0.36506
## TmMEM              640128    1872901   0.342  0.73268
## TmMIA            -2523430    1947381  -1.296  0.19573
## TmMIL              150316    1944999   0.077  0.93843
## TmMIN              -66843    2091416  -0.032  0.97452
## TmNOP            -1638526    1982320  -0.827  0.40893
## TmNYK             -264742    1963784  -0.135  0.89282
## TmOKC              -48759    1991100  -0.024  0.98047
## TmORL             -276970    1926414  -0.144  0.88574
## TmPHI            -3226845    1925605  -1.676  0.09450 .
## TmPHO              109809    1972982   0.056  0.95564
## TmPOR            -1210319    1983157  -0.610  0.54198
## TmSAC             -511630    2068662  -0.247  0.80477
## TmSAS            -3156541    1961493  -1.609  0.10828
## TmTOR             -991863    2021814  -0.491  0.62397
## TmTOT            -1546094    1532585  -1.009  0.31362
## TmUTA            -4131203    1917935  -2.154  0.03179 *
## TmWAS              418446    2000757   0.209  0.83443
## G                  -86152      17942  -4.802 2.17e-06 ***
## TS.              -4102472    4438516  -0.924  0.35585
## ORB.               -53619      70899  -0.756  0.44989
## DRB.               -52796      58305  -0.906  0.36569
## AST.               -39322      40378  -0.974  0.33067
## STL.              -943063     401350  -2.350  0.01923 *
## BLK.              -552403     243594  -2.268  0.02383 *
## TOV.                -7679      52681  -0.146  0.88417
## USG.               242464      74067   3.274  0.00115 **
## OWS               1118704     202855   5.515 5.99e-08 ***
## DWS               2779587     547720   5.075 5.75e-07 ***
## OBPM                95399     104346   0.914  0.36109
## DBPM               673536     287494   2.343  0.01959 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5273000 on 437 degrees of freedom
```

```
## Multiple R-squared:  0.5395, Adjusted R-squared:  0.4921
## F-statistic: 11.38 on 45 and 437 DF,  p-value: < 2.2e-16
```

#Selección de variables

```
regres01=lm(Salary~NBA_DraftNumber+log(Age)+Tm+G+MP+PER+TS.+ORB.+DRB.+AST.+STL.+BLK.+TOV.+USG.+OWS
            +DWS+OBPM+DBPM+VORP, data = mData)
regres02=lm(Salary~NBA_DraftNumber+log(Age)+Tm+G+TS.+ORB.+DRB.+AST.+STL.+BLK.+TOV.+USG.+OWS
            +DWS+OBPM+DBPM, data = mData)
anova(regres02, regres01)
```

```
## Analysis of Variance Table
##
## Model 1: Salary ~ NBA_DraftNumber + log(Age) + Tm + G + TS. + ORB. + DRB. +
##     AST. + STL. + BLK. + TOV. + USG. + OWS + DWS + OBPM + DBPM
## Model 2: Salary ~ NBA_DraftNumber + log(Age) + Tm + G + MP + PER + TS. +
##     ORB. + DRB. + AST. + STL. + BLK. + TOV. + USG. + OWS + DWS +
##     OBPM + DBPM + VORP
##   Res.Df        RSS Df  Sum of Sq      F    Pr(>F)
## 1    437 1.2148e+16
## 2    434 1.1352e+16  3 7.9599e+14 10.144 1.806e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
AIC(regres01,regres02)
```

```
##          df      AIC
## regres01 50 16341.39
## regres02 47 16368.12
```

```
BIC(regres01,regres02)
```

```
##          df      BIC
## regres01 50 16550.39
## regres02 47 16564.58
```

Me debo de quedar con el modelo con menor AIC o menor BIC, por tanto al final escojo la primera regresion

```
library(leaps)
library(MASS)
```

```
##
## Attaching package: 'MASS'
```

```
## The following object is masked from 'package:dplyr':
##
##     select
```

```r
stepAIC(regres01, direction = "both")
```

```
## Start:  AIC=14968.69
## Salary ~ NBA_DraftNumber + log(Age) + Tm + G + MP + PER + TS. +
##     ORB. + DRB. + AST. + STL. + BLK. + TOV. + USG. + OWS + DWS +
##     OBPM + DBPM + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - Tm              30 4.6225e+14 1.1815e+16 14928
## - ORB.             1 5.2682e+10 1.1352e+16 14967
## - TS.              1 5.1984e+11 1.1353e+16 14967
## - DWS              1 9.8959e+11 1.1353e+16 14967
## - PER              1 1.8042e+12 1.1354e+16 14967
## - AST.             1 2.5245e+12 1.1355e+16 14967
## - OBPM             1 3.1024e+12 1.1355e+16 14967
## - TOV.             1 5.5552e+12 1.1358e+16 14967
## - BLK.             1 1.5106e+13 1.1367e+16 14967
## - VORP             1 1.8331e+13 1.1371e+16 14968
## - DRB.             1 2.2511e+13 1.1375e+16 14968
## - STL.             1 4.4041e+13 1.1396e+16 14969
## <none>                          1.1352e+16 14969
## - OWS              1 5.5920e+13 1.1408e+16 14969
## - DBPM             1 6.7559e+13 1.1420e+16 14970
## - USG.             1 9.5731e+13 1.1448e+16 14971
## - NBA_DraftNumber  1 5.6633e+14 1.1919e+16 14990
## - MP               1 7.7262e+14 1.2125e+16 14998
## - G                1 1.1114e+15 1.2464e+16 15012
## - log(Age)         1 2.2332e+15 1.3586e+16 15053
##
## Step:  AIC=14927.97
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + PER + TS. + ORB. +
##     DRB. + AST. + STL. + BLK. + TOV. + USG. + OWS + DWS + OBPM +
##     DBPM + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - ORB.             1 1.4239e+09 1.1815e+16 14926
## - TS.              1 1.9225e+10 1.1815e+16 14926
## - DWS              1 5.1384e+10 1.1815e+16 14926
## - TOV.             1 9.1752e+11 1.1816e+16 14926
## - AST.             1 2.7705e+12 1.1817e+16 14926
## - BLK.             1 5.9623e+12 1.1821e+16 14926
## - PER              1 8.9923e+12 1.1824e+16 14926
## - OBPM             1 9.1320e+12 1.1824e+16 14926
## - VORP             1 3.1202e+13 1.1846e+16 14927
## - STL.             1 3.3858e+13 1.1848e+16 14927
## - DRB.             1 4.0742e+13 1.1855e+16 14928
## <none>                          1.1815e+16 14928
## - DBPM             1 4.9256e+13 1.1864e+16 14928
## - OWS              1 6.7947e+13 1.1883e+16 14929
## - USG.             1 1.0422e+14 1.1919e+16 14930
## - NBA_DraftNumber  1 7.8582e+14 1.2600e+16 14957
## - MP               1 9.1347e+14 1.2728e+16 14962
## - G                1 9.5237e+14 1.2767e+16 14963
```

```
## + Tm              30 4.6225e+14 1.1352e+16 14969
## - log(Age)         1 2.4300e+15 1.4245e+16 15016
##
## Step:  AIC=14925.97
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + PER + TS. + DRB. +
##     AST. + STL. + BLK. + TOV. + USG. + OWS + DWS + OBPM + DBPM +
##     VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - TS.              1 1.9165e+10 1.1815e+16 14924
## - DWS              1 5.1779e+10 1.1815e+16 14924
## - TOV.             1 9.3971e+11 1.1816e+16 14924
## - AST.             1 2.8710e+12 1.1817e+16 14924
## - BLK.             1 6.0381e+12 1.1821e+16 14924
## - PER              1 9.7465e+12 1.1824e+16 14924
## - OBPM             1 9.8710e+12 1.1824e+16 14924
## - VORP             1 3.1329e+13 1.1846e+16 14925
## - STL.             1 3.3857e+13 1.1848e+16 14925
## - DRB.             1 4.0970e+13 1.1856e+16 14926
## <none>                          1.1815e+16 14926
## - DBPM             1 4.9469e+13 1.1864e+16 14926
## - OWS              1 6.8174e+13 1.1883e+16 14927
## + ORB.             1 1.4239e+09 1.1815e+16 14928
## - USG.             1 1.0487e+14 1.1919e+16 14928
## - NBA_DraftNumber  1 7.8593e+14 1.2601e+16 14955
## - MP               1 9.2347e+14 1.2738e+16 14960
## - G                1 9.6234e+14 1.2777e+16 14962
## + Tm              30 4.6219e+14 1.1352e+16 14967
## - log(Age)         1 2.4309e+15 1.4246e+16 15014
##
## Step:  AIC=14923.97
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + PER + DRB. + AST. +
##     STL. + BLK. + TOV. + USG. + OWS + DWS + OBPM + DBPM + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - DWS              1 4.9268e+10 1.1815e+16 14922
## - TOV.             1 1.3178e+12 1.1816e+16 14922
## - AST.             1 2.9239e+12 1.1818e+16 14922
## - BLK.             1 6.1486e+12 1.1821e+16 14922
## - PER              1 9.8625e+12 1.1824e+16 14922
## - OBPM             1 1.0416e+13 1.1825e+16 14922
## - VORP             1 3.1963e+13 1.1847e+16 14923
## - STL.             1 3.4044e+13 1.1849e+16 14923
## - DRB.             1 4.1028e+13 1.1856e+16 14924
## <none>                          1.1815e+16 14924
## - DBPM             1 4.9522e+13 1.1864e+16 14924
## - OWS              1 6.9684e+13 1.1884e+16 14925
## + TS.              1 1.9165e+10 1.1815e+16 14926
## + ORB.             1 1.3635e+09 1.1815e+16 14926
## - USG.             1 1.0536e+14 1.1920e+16 14926
## - NBA_DraftNumber  1 7.8720e+14 1.2602e+16 14953
## - MP               1 9.3823e+14 1.2753e+16 14959
## - G                1 9.8701e+14 1.2802e+16 14961
## + Tm              30 4.6169e+14 1.1353e+16 14965
```

```
## - log(Age)         1 2.4313e+15 1.4246e+16 15012
##
## Step:  AIC=14921.97
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + PER + DRB. + AST. +
##     STL. + BLK. + TOV. + USG. + OWS + OBPM + DBPM + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - TOV.             1 1.3662e+12 1.1816e+16 14920
## - AST.             1 3.2606e+12 1.1818e+16 14920
## - BLK.             1 6.6880e+12 1.1821e+16 14920
## - PER              1 1.0404e+13 1.1825e+16 14920
## - OBPM             1 1.0987e+13 1.1826e+16 14920
## - STL.             1 3.5611e+13 1.1850e+16 14921
## - DRB.             1 4.1052e+13 1.1856e+16 14922
## <none>                          1.1815e+16 14922
## - VORP             1 5.1299e+13 1.1866e+16 14922
## - DBPM             1 5.4060e+13 1.1869e+16 14922
## - OWS              1 8.2290e+13 1.1897e+16 14923
## + DWS              1 4.9268e+10 1.1815e+16 14924
## + TS.              1 1.6653e+10 1.1815e+16 14924
## + ORB.             1 1.7452e+09 1.1815e+16 14924
## - USG.             1 1.0584e+14 1.1920e+16 14924
## - NBA_DraftNumber  1 7.8724e+14 1.2602e+16 14951
## - G                1 1.0156e+15 1.2830e+16 14960
## + Tm              30 4.6082e+14 1.1354e+16 14963
## - MP               1 1.1873e+15 1.3002e+16 14966
## - log(Age)         1 2.4422e+15 1.4257e+16 15011
##
## Step:  AIC=14920.03
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + PER + DRB. + AST. +
##     STL. + BLK. + USG. + OWS + OBPM + DBPM + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - AST.             1 4.9533e+12 1.1821e+16 14918
## - BLK.             1 6.0965e+12 1.1822e+16 14918
## - PER              1 1.3392e+13 1.1829e+16 14919
## - OBPM             1 1.4756e+13 1.1831e+16 14919
## - STL.             1 3.4260e+13 1.1850e+16 14919
## - DRB.             1 4.4225e+13 1.1860e+16 14920
## <none>                          1.1816e+16 14920
## - VORP             1 5.0003e+13 1.1866e+16 14920
## - DBPM             1 5.2730e+13 1.1869e+16 14920
## - OWS              1 8.7943e+13 1.1904e+16 14922
## + TOV.             1 1.3662e+12 1.1815e+16 14922
## + TS.              1 3.9604e+11 1.1816e+16 14922
## + DWS              1 9.7658e+10 1.1816e+16 14922
## + ORB.             1 3.8562e+10 1.1816e+16 14922
## - USG.             1 1.1199e+14 1.1928e+16 14923
## - NBA_DraftNumber  1 8.0511e+14 1.2621e+16 14950
## - G                1 1.0148e+15 1.2831e+16 14958
## + Tm              30 4.5360e+14 1.1362e+16 14961
## - MP               1 1.1859e+15 1.3002e+16 14964
## - log(Age)         1 2.4516e+15 1.4268e+16 15009
##
```

```
## Step:  AIC=14918.23
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + PER + DRB. + STL. +
##     BLK. + USG. + OWS + OBPM + DBPM + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - BLK.             1 3.0697e+12 1.1824e+16 14916
## - PER              1 1.6161e+13 1.1837e+16 14917
## - OBPM             1 1.7074e+13 1.1838e+16 14917
## - STL.             1 3.0749e+13 1.1852e+16 14918
## - VORP             1 4.6340e+13 1.1867e+16 14918
## - DBPM             1 4.7970e+13 1.1869e+16 14918
## <none>                          1.1821e+16 14918
## - DRB.             1 6.1332e+13 1.1882e+16 14919
## - OWS              1 9.1265e+13 1.1912e+16 14920
## + AST.             1 4.9533e+12 1.1816e+16 14920
## + TOV.             1 3.0589e+12 1.1818e+16 14920
## + DWS              1 7.5080e+11 1.1820e+16 14920
## + TS.              1 1.4142e+11 1.1821e+16 14920
## + ORB.             1 4.8331e+10 1.1821e+16 14920
## - USG.             1 1.0992e+14 1.1931e+16 14921
## - NBA_DraftNumber  1 8.0390e+14 1.2625e+16 14948
## - G                1 1.0190e+15 1.2840e+16 14956
## + Tm              30 4.5285e+14 1.1368e+16 14959
## - MP               1 1.2000e+15 1.3021e+16 14963
## - log(Age)         1 2.4550e+15 1.4276e+16 15007
##
## Step:  AIC=14916.36
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + PER + DRB. + STL. +
##     USG. + OWS + OBPM + DBPM + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - STL.             1 2.8461e+13 1.1853e+16 14916
## - OBPM             1 3.8300e+13 1.1862e+16 14916
## - PER              1 3.8421e+13 1.1862e+16 14916
## - VORP             1 4.5108e+13 1.1869e+16 14916
## <none>                          1.1824e+16 14916
## - DBPM             1 4.9074e+13 1.1873e+16 14916
## - DRB.             1 7.9714e+13 1.1904e+16 14918
## - OWS              1 9.1866e+13 1.1916e+16 14918
## + BLK.             1 3.0697e+12 1.1821e+16 14918
## + AST.             1 1.9265e+12 1.1822e+16 14918
## + TOV.             1 1.6924e+12 1.1822e+16 14918
## + DWS              1 1.1245e+12 1.1823e+16 14918
## + TS.              1 2.5219e+11 1.1824e+16 14918
## + ORB.             1 6.4723e+09 1.1824e+16 14918
## - USG.             1 1.1019e+14 1.1934e+16 14919
## - NBA_DraftNumber  1 8.0514e+14 1.2629e+16 14946
## - G                1 1.0310e+15 1.2855e+16 14955
## + Tm              30 4.4859e+14 1.1375e+16 14958
## - MP               1 1.2384e+15 1.3062e+16 14962
## - log(Age)         1 2.4545e+15 1.4279e+16 15006
##
## Step:  AIC=14915.52
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + PER + DRB. + USG. +
```

```
##     OWS + OBPM + DBPM + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - DBPM             1 2.2749e+13 1.1875e+16 14914
## - OBPM             1 3.7682e+13 1.1890e+16 14915
## - PER              1 3.8960e+13 1.1891e+16 14915
## - VORP             1 4.9171e+13 1.1902e+16 14916
## <none>                          1.1853e+16 14916
## + STL.             1 2.8461e+13 1.1824e+16 14916
## - USG.             1 9.0254e+13 1.1943e+16 14917
## - OWS              1 9.0312e+13 1.1943e+16 14917
## + DWS              1 2.0772e+12 1.1850e+16 14917
## + AST.             1 2.0491e+12 1.1850e+16 14917
## + BLK.             1 7.8081e+11 1.1852e+16 14918
## + TS.              1 5.7568e+11 1.1852e+16 14918
## + TOV.             1 1.3436e+11 1.1852e+16 14918
## + ORB.             1 1.3395e+11 1.1852e+16 14918
## - DRB.             1 1.4902e+14 1.2002e+16 14920
## - NBA_DraftNumber  1 8.1662e+14 1.2669e+16 14946
## - G                1 1.0026e+15 1.2855e+16 14953
## + Tm              30 4.5301e+14 1.1400e+16 14957
## - MP               1 1.2269e+15 1.3079e+16 14961
## - log(Age)         1 2.4751e+15 1.4328e+16 15005
##
## Step:  AIC=14914.44
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + PER + DRB. + USG. +
##     OWS + OBPM + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - OBPM             1 2.4741e+13 1.1900e+16 14913
## - PER              1 2.5258e+13 1.1901e+16 14914
## <none>                          1.1875e+16 14914
## - USG.             1 6.8043e+13 1.1943e+16 14915
## - OWS              1 6.8359e+13 1.1944e+16 14915
## + DBPM             1 2.2749e+13 1.1853e+16 14916
## + BLK.             1 5.1369e+12 1.1870e+16 14916
## + DWS              1 3.8644e+12 1.1871e+16 14916
## + STL.             1 2.1351e+12 1.1873e+16 14916
## + TS.              1 6.7992e+10 1.1875e+16 14916
## + AST.             1 6.3259e+10 1.1875e+16 14916
## + ORB.             1 3.4854e+10 1.1875e+16 14916
## + TOV.             1 1.4044e+10 1.1875e+16 14916
## - VORP             1 1.2903e+14 1.2004e+16 14918
## - DRB.             1 1.8117e+14 1.2056e+16 14920
## - NBA_DraftNumber  1 8.6937e+14 1.2745e+16 14947
## - G                1 9.8923e+14 1.2864e+16 14951
## + Tm              30 4.4617e+14 1.1429e+16 14956
## - MP               1 1.2244e+15 1.3100e+16 14960
## - log(Age)         1 2.4656e+15 1.4341e+16 15004
##
## Step:  AIC=14913.45
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + PER + DRB. + USG. +
##     OWS + VORP
##
```

```
##                   Df  Sum of Sq        RSS   AIC
## - PER              1 9.1780e+11 1.1901e+16 14912
## - USG.             1 4.5556e+13 1.1946e+16 14913
## <none>                          1.1900e+16 14913
## - OWS              1 6.4090e+13 1.1964e+16 14914
## + OBPM             1 2.4741e+13 1.1875e+16 14914
## + DBPM             1 9.8074e+12 1.1890e+16 14915
## + ORB.             1 5.3489e+12 1.1895e+16 14915
## + STL.             1 5.1915e+12 1.1895e+16 14915
## + TOV.             1 1.9234e+12 1.1898e+16 14915
## + TS.              1 1.0352e+12 1.1899e+16 14915
## + BLK.             1 9.7014e+11 1.1899e+16 14915
## + DWS              1 2.6451e+11 1.1900e+16 14915
## + AST.             1 1.0677e+09 1.1900e+16 14915
## - VORP             1 1.4299e+14 1.2043e+16 14917
## - DRB.             1 1.8393e+14 1.2084e+16 14919
## - NBA_DraftNumber  1 8.6234e+14 1.2762e+16 14945
## - G                1 9.7879e+14 1.2879e+16 14950
## + Tm              30 4.5193e+14 1.1448e+16 14955
## - MP               1 1.3066e+15 1.3207e+16 14962
## - log(Age)         1 2.5399e+15 1.4440e+16 15005
##
## Step:  AIC=14911.49
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + DRB. + USG. +
##     OWS + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## - USG.             1 4.6532e+13 1.1947e+16 14911
## <none>                          1.1901e+16 14912
## - OWS              1 6.3307e+13 1.1964e+16 14912
## + DBPM             1 9.0851e+12 1.1892e+16 14913
## + STL.             1 5.6149e+12 1.1895e+16 14913
## + ORB.             1 5.4760e+12 1.1895e+16 14913
## + TOV.             1 1.6699e+12 1.1899e+16 14913
## + BLK.             1 1.2944e+12 1.1900e+16 14913
## + PER              1 9.1780e+11 1.1900e+16 14913
## + OBPM             1 4.0140e+11 1.1901e+16 14914
## + DWS              1 2.2465e+11 1.1901e+16 14914
## + TS.              1 1.4985e+10 1.1901e+16 14914
## + AST.             1 8.3602e+08 1.1901e+16 14914
## - VORP             1 1.4253e+14 1.2043e+16 14915
## - DRB.             1 1.8375e+14 1.2085e+16 14917
## - NBA_DraftNumber  1 8.6170e+14 1.2763e+16 14943
## - G                1 1.0029e+15 1.2904e+16 14949
## + Tm              30 4.5284e+14 1.1448e+16 14953
## - MP               1 1.3339e+15 1.3235e+16 14961
## - log(Age)         1 2.5409e+15 1.4442e+16 15003
##
## Step:  AIC=14911.37
## Salary ~ NBA_DraftNumber + log(Age) + G + MP + DRB. + OWS + VORP
##
##                   Df  Sum of Sq        RSS   AIC
## <none>                          1.1947e+16 14911
## + USG.             1 4.6532e+13 1.1901e+16 14912
```

```
## - OWS              1 6.8257e+13 1.2016e+16 14912
## + STL.             1 8.0234e+12 1.1939e+16 14913
## + AST.             1 4.1060e+12 1.1943e+16 14913
## + ORB.             1 3.5627e+12 1.1944e+16 14913
## + OBPM             1 3.2583e+12 1.1944e+16 14913
## + TOV.             1 2.9054e+12 1.1945e+16 14913
## + PER              1 1.8941e+12 1.1946e+16 14913
## + BLK.             1 8.9671e+11 1.1947e+16 14913
## + DBPM             1 7.1574e+11 1.1947e+16 14913
## + DWS              1 2.2552e+11 1.1947e+16 14913
## + TS.              1 2.0942e+11 1.1947e+16 14913
## - VORP             1 1.4973e+14 1.2097e+16 14915
## - DRB.             1 1.7522e+14 1.2123e+16 14916
## - NBA_DraftNumber  1 9.2411e+14 1.2872e+16 14945
## + Tm              30 4.6187e+14 1.1486e+16 14952
## - G                1 1.3024e+15 1.3250e+16 14959
## - MP               1 1.6338e+15 1.3581e+16 14971
## - log(Age)         1 2.5004e+15 1.4448e+16 15001

##
## Call:
## lm(formula = Salary ~ NBA_DraftNumber + log(Age) + G + MP + DRB. +
##     OWS + VORP, data = mData)
##
## Coefficients:
##     (Intercept)  NBA_DraftNumber         log(Age)                G
##       -40805088           -71844         14608720          -149351
##              MP             DRB.              OWS             VORP
##            5984            96952           435056           980901
```

Una vez llevada a cabo la selección de variables, determino que el mejor modelo es el siguiente:

```
regres02 = lm(Salary~NBA_DraftNumber+log(Age)+G+MP+DRB.+OWS
           +VORP, data = mData)
summary(regres02)
```

```
##
## Call:
## lm(formula = Salary ~ NBA_DraftNumber + log(Age) + G + MP + DRB. +
##     OWS + VORP, data = mData)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -15250356  -3062041   -309806   2222453  21056894
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)     -4.081e+07  4.826e+06  -8.456 3.44e-16 ***
## NBA_DraftNumber -7.184e+04  1.185e+04  -6.061 2.75e-09 ***
## log(Age)         1.461e+07  1.465e+06   9.971  < 2e-16 ***
## G               -1.494e+05  2.075e+04  -7.196 2.43e-12 ***
## MP               5.984e+03  7.425e+02   8.060 6.26e-15 ***
## DRB.             9.695e+04  3.673e+04   2.639  0.00858 **
```

```
## OWS              4.351e+05  2.641e+05   1.647  0.10015
## VORP             9.809e+05  4.020e+05   2.440  0.01506 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5015000 on 475 degrees of freedom
## Multiple R-squared:  0.5471, Adjusted R-squared:  0.5405
## F-statistic: 81.98 on 7 and 475 DF,  p-value: < 2.2e-16
```

#Cross Validation ##Validation Test

```
library(ISLR)
set.seed(250)
numData=nrow(mData)
train=sample(numData ,numData/2)

regres.train =lm(Salary~NBA_DraftNumber+log(Age)+G+MP+DRB.+OWS
            +VORP,mData ,subset =train )
attach(mData)
mean((Salary-predict(regres.train ,Auto))[-train ]^2)
```

```
## Warning: 'newdata' had 392 rows but variables found have 483 rows

## [1] 2.440054e+13
```

```
glm.fit1=glm(Salary~NBA_DraftNumber+log(Age)+G+MP+DRB.+OWS
            +VORP,mData,family = gaussian())
coef(glm.fit1)
```

```
##     (Intercept) NBA_DraftNumber        log(Age)               G
##   -40805088.359      -71843.690    14608720.089     -149351.050
##              MP            DRB.             OWS            VORP
##        5983.889       96951.890      435056.370      980901.169
```

```
library(boot)
```

```
##
## Attaching package: 'boot'

## The following object is masked from 'package:car':
##
##     logit
```

```
cv.err =cv.glm(mData,glm.fit1)
cv.err$delta
```

```
## [1] 2.570603e+13 2.570501e+13
```